

CHAPTER 2

REVIEW OF LITERATURE

2.0 INTRODUCTION

Local research in the field of creativity has not been very extensive. To the knowledge of the researcher, fewer than ten local studies have been carried out since the 1980s in the University of Malaya. However, in the United States of America this interesting area of study has long been established as highly important for the purposes of business, education, industry and many other fields since the beginning of the twentieth century. Following is a brief overview of the historical development of research in the field of creativity.

Before the 1940s, only a few creativity development approaches were known of in the United States of America. *How We Think* written by John Dewey in 1910 advocated learning by doing which helped start a trend towards a more creative type of teaching. In 1925, Terman contributed to the understanding of gifted individuals. By gifted individuals he was referring to those individuals who had the ability to perform abstract thinking as Terman was of the opinion that this ability was the nature of human intelligence. Then in 1926, Graham Wallas came up with a model for creativity that was considered a classic. In his book *The Art of Thought*, he described a four-stage process for creativity, which consisted of (1) preparation, (2) incubation, (3) illumination and (4) verification. Wallas set down a description of what happens as people approach problems with the objective of coming up with creative solutions.

It was in the 1950s that things really began to happen with respect to creativity. Research reports were presented at conferences and symposiums on the various sub areas of creativity. There were also research centres which turned their attention to the problems of creativity, while other centres looked into new findings about creative persons and the creative processes.

Specifically, in 1950, J.P. Guilford's presidential address to the American Psychological Association entitled 'Creativity' spurred interest in the scientific study of creativity. His attempts to conceptualize the requisite mental processes led to the construction of his now widely known 'Structure of Intellect'. From Guilford's theory of the intellect, a distinction between convergent thinking, which involves deducing the one correct idea or thought and divergent thinking, which is thinking of many different and original ideas, emerged. He developed tests of creativity to measure divergent thinking, which emphasise richness and novelty of ideas. Using a battery of tests, Guilford managed to prove that primary intellectual factors account for individual differences in creativity. Following this, countless tests have been devised to measure creative abilities or to evaluate personality dispositions for creative thinking. However, "the problem with developing a highly reliable and highly valid creativity test is that creativity is such a complicated construct" (Davis, 1989b).

About the same time, but from a totally different perspective, Alex F. Osborn (1953), the co-founder of a major advertising agency (Batten, Barton, Durstine, and Osborn) came up with ways to nurture the potential of individuals so that they might think and act creatively and innovatively. Osborn advocated the 'deferment of judgment' to allow a free flow of ideas as the cardinal principle of brainstorming through applied imagination. Osborn's

efforts in the 1950s resulted in him becoming the founder of the Creative Education Foundation and the annual Creative Problem-Solving Institutes.

Then came along Synectics (Gordon, 1961; Prince, 1970), which is the use of metaphor and analogy to generate new conceptual associations in problem-solving, and alongside this, in the 1960s and 1970s emerged creativity-development which stressed spontaneous imagery processes. Imagery refers to the images or mental pictures that have been organised into some kind of pattern. An early advocate of the imagery processes was Walkup (1967). Then appeared Functional Visualisation (Taylor, 1969). Taylor bridges problem-finding and imagery by illustrating the need for accurately defining a problem if the solution is to be relevant. Functional Visualisation is the method for making the transition from problem definition to solution. After that, came Mind Games (Masters & Houston, 1972) and Wenger's Psychegeinics (1979). Wenger defined psychegeinics as the study of those effects, which are produced through and with or by the mind. Historically, as a discipline, psychegeinics has mostly been engaged in the pursuit of higher actualizations of human potential.

From the 1970s onward, creative-thinking concepts evolved and spread throughout society, and around the world. Programmes for the deliberate development of creativity besides Creative Problem-Solving (Osborn, 1963; Parnes, 1967) and Synectics include meditational procedures (Gowan, 1978) and whole brain problem solving (Herrmann, 1991).

2.1 DEFINITIONS OF CREATIVITY

There are about as many definitions, theories, and ideas about creativity as there are people who have set their ideas on paper. In 1975 Folmer said, "...no coherent theory was ever able to be formulated, while opinions on the problem have become frequently incompatible, if not contradictory" (Davis, 1992). There is no one definition of creativity that everyone can agree upon. With this in view, the researcher has defined creativity as stated in 1.4, page 10.

Creativity researchers, mostly from the field of psychology, usually claim that being creative means being novel and appropriate where appropriate refers to the qualities of suitability, utility, and value. For example, one definition of creativity would include the ability to take existing objects and combine them in different ways for new purposes. Another way of looking at creativity is the ability to look at the way things are interrelated from different perspectives plus generate novel and useful ideas and solutions to everyday problems and challenges. Besides this, creativity also involves the transformation of our talents and foresight into a reality, which manifests itself externally in new and useful ways. Koestler (1964) says that, "...the creative act consisted in a new synthesis of previously unconnected matrices of thought".

Due to its complexity and multifaceted nature, creativity has no clear, unambiguous and widely accepted definition (Keating, 1980). Therefore, the definitions of creativity have been categorised by Rhodes (1961) in terms of the four Ps: the creative *person*, the creative *product*, the creative *process* (Barron, 1988), and the creative *press* (environment, climate,

place; Isaksen, 1987; Mooney, 1963; Taylor, 1988). Torrance (1988) summarised the four Ps by saying,

I chose a process definition of creativity for research purposes. I thought that if I chose a process as a focus, I could then ask what kind of person one must be to engage in the process successfully, what kinds of environments will facilitate it, and what kinds of products will result from successful operation of the processes.

2.1.1 The Creative Person

Lowenfeld (1952) listed eight characteristics of a creative person that is sensitivity, fluency, flexibility, originality, ability to re-define, ability to abstract, ability to synthesise, and coherence of organisation. A more recent definition of a creative person is Sternberg's (1988a) **three-facet model of creativity** summarised in the statement,

... creativity is ... a peculiar intersection between three psychological attributes: intelligence, cognitive style, and personality/motivation. Taken together, these three facets of the mind help us understand what lies behind the creative individual.

Studies have indicated that creative people have a lot of traits in common. In order to better understand, identify, and nurture creative people we need to study the characteristics of creativity. Davis (1992) states three types of characteristics that combine to produce creativeness: personality traits (affective), cognitive abilities, and biographical traits (learning).

Personality characteristics of creative people have been researched and listed by Barron (1961, 1969, 1978, 1988), MacKinnon (1976, 1978a, 1978b), and Torrance (1962, 1979,

1981a, 1984a, 1984b, 1987a, 1988) just to name a few. Based on the studies done by these researchers, Davis (1992) identified 12 major characteristics often observed in creative people. They are creative consciousness, originality, independence, willing to take risks, being artistic, curious, energetic, open-minded, perceptive, attracted to complexity and novelty, having a good sense of humour and a need for privacy.

Cognitive abilities are both inherited and learned. Frank Barron (1988) stipulated six 'ingredients' of creativity which mix affective and cognitive traits: recognizing patterns, making connections, taking risks, challenging assumptions, taking advantage of chance, seeing in new ways. These 'ingredients' make up the base of creative thinking. Besides this, four popular and important creative abilities advocated by Torrance are fluency, flexibility, originality and elaboration.

Yong (1993) has identified the Malaysian creative person as being intense, energetic, committed, unconforming, and confident. The behavioral profile of a creative person based on the interaction of four dimensions of human tendencies namely dominance, influence, steadiness, and cautiousness can be used to help individuals to be more conscious of creative behavior. It can also help teachers to encourage students develop creative behaviour unnatural to them.

2.1.2 The Creative Process

Davis (1992) says that the phrase 'creative process' is used in many different ways. It can refer to sets of steps or stages, perceptual change or techniques and strategies that creative

people use to produce new idea combinations, relationships, meanings, perceptions and transformations.

As mentioned earlier (refer to 2.0, page 18), first we have Wallas' 1926 four-stage classic model. This model consists of the preparation, incubation, illumination, and verification stages. In the preparation stage, the problem is identified, relevant information is gathered for a solution and the criteria for verifying the solution is itemised. Next, is the incubation stage. Using Wallas' own words,

The incubation stage covers two different things, of which the first is the negative fact that during incubation we do not voluntarily or consciously think on a particular problem, and the second is the positive fact that a series of unconscious and involuntary (or foreconscious and forevoluntary) mental events may take place during that period ... the period of abstention may be spent either in conscious mental work on other problems, or in a relaxation from all conscious mental work.

Like the previous stage, incubation can last minutes, weeks, or even years. Then comes the illumination stage where the mind produces ideas, which constitute the basis of a creative response. These ideas can be pieces of the whole or the entire concept in itself. Illumination involves an explosion of insights and is often very brief. The final stage, verification, is to check whether the ideas derived from illumination satisfy the need and criteria for the solution.

In fact some of those who have elaborated and refined Wallas's conceptualization are Osborn (1948), Parnes and Harding (1962), de Bono (1967), and Parnes, Noller, and Biondi (1977).

Then, there are the seven areas in the creative process described by Roger von Oech (1983). This is made up of a germinal phase where ideas arise, and a practical phase where ideas are evaluated and processed. In this model, the focus is on the germinal phase where ideas are generated and manipulated. Below is a diagram, which shows the creative process as described by von Oech.

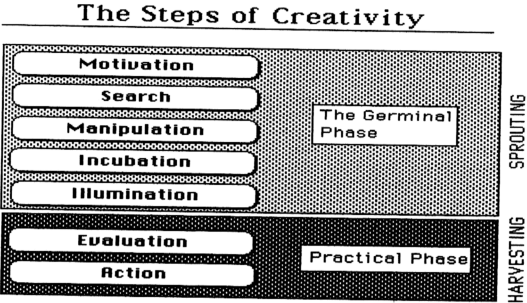


Diagram 2.1: The Steps of Creativity (Roger von Oech)

Besides the above, the creative process frequently involves perceptual transformation. Suddenly there is a new way of looking at something and this sudden perceptual change is the mental activity that underlies creative insight itself. One could say that it is the birth of creative inspiration.

Then we also have the steps of the Osborn-Parnes (1987) creative problem-solving model. This model has a total of six stages, which are objective finding, fact finding, problem finding, idea finding, solution finding, and acceptance finding. An important aspect of this

model is that each step first involves a divergent thinking phase for generating as many ideas as possible and then a convergent phase for selecting the most promising of these ideas. The following diagram illustrates the divergent or convergent nature of each stage.

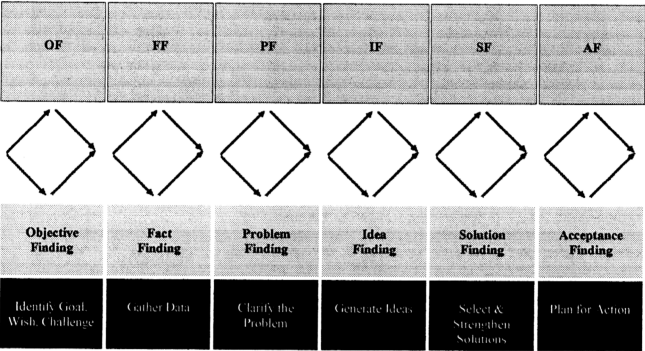


Diagram 2.2: The Osborn-Parnes Creative Problem Solving Process

In 1989, Ned Herrmann having worked on Wallas’ four stages of the creative process, took it a step further and related them to the four brain quadrants. He came up with a model to show how the brain works while engaged in the creative process. Below is the whole-brain creativity model by Ned Herrmann from his book *The Creative Brain*.

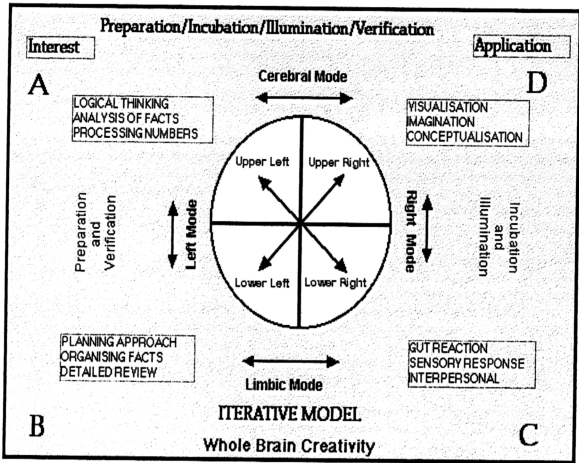


Diagram 2.3: Whole-brain Creativity Model

To sum up, although the creative process of a creative individual is influenced by experiences, abilities, thinking and the requirements of different and specific problems, it is still, to a certain extent, the same in different areas and among people with different creative specialties. This is because there are commonalities in the creative process such as (1) combining ideas, (2) using similar idea-finding techniques, and (3) proceeding through similar steps. Ghiselin (1952) says that, "...the creative process is the process of change, of development, of evolution, in the organisation of subjective life and completes itself only as the products of invention transform the environment."

2.1.3 The Creative Product

According to Shapiro (1975), a variety of products are possible in terms of quantity and quality when considering the analysis of a scientist's creative products. Still referring to the field of scientific products, McPherson (1964) recommended an analytical scheme for guiding judges in assessing products. He believed certain relevant characteristics could be used in assessing the creativeness of products and these are as follows.

1. The realization of the product demanded intellectual activity, which can best be defined as 'creative strength'.
2. Usefulness is the second essential characteristic of the inventive level. A new product must be useful – it must represent a beneficial technological advance.
3. The invention must be new, in terms of overcoming special difficulties. The human response to an invention, so characterized, is typically one of surprise.
4. It is considered relevant that the inventor did an appreciable amount of experimenting before achieving his novel invention.
5. The inventive level is deemed to be present where a product is successfully achieved in a field characterized by a history of failure.
6. Credit is given if evidence indicates that other individuals in the same branch of activity were previously skeptical of the likelihood of success for a new development such as that particular invention.
7. There should have been a previously unfulfilled desire, now fulfilled by virtue of the birth of the new product.

Even though all of the above characteristics specifically refer to the assessment of scientific creative products, generally it emphasises both originality and worth, which can be applied to non-scientific creative products as well.

This can be seen clearly in Barron's (1988) statement, "Creativity is an ability to respond adaptively to the needs for new approaches and new products. It is essentially the ability to bring something new into existence purposefully." Barron further emphasises the purposefulness of innovations when he says,

... their aptness, their validity, their adequacy in meeting a need, and a rather subtle additional property that may be called, simply, fitness – esthetic fitness, ecological fitness, optimum form, being "right" as well as original at the moment. The emphasis is on whatever is fresh, novel unusual, ingenious, clever, and apt.

All in all the definition of creativity according to its product is not an entity in itself and is very closely related to the definition of creativity in the process category. This is because the creative product is a concrete and visible observable outcome of the creative process.

2.1.4 The Creative Press

The final category of definitions of creativity is the creative press, which refers to the social and the psychological environment.

The social environment encompasses the response to social needs and society as judge.

In a time when knowledge, constructive and destructive, is advancing by the most incredible leaps and bounds into a fantastic atomic age, genuinely

creative adaptation seems to represent the only possibility that man can keep abreast with the kaleidoscopic change in his world (Rogers, 1954).

Supporting this statement, Rhodes (1987) says that many creative innovations and inventions are in response to social and current needs. Besides that, for many types of technological innovations, the environment must offer “... a sufficiently advanced stage of culture and a proper technical heritage”.

In addition to this, society decides who and what is creative. Csikszentmihalyi (1988) believes that,

... what we call creative is never the result of individual action alone; it is the product of three main shaping forces: a set of social institutions, or *field*, that selects from the variations produced by individuals those that are worth preserving; a stable cultural *domain* that will preserve and transmit the selected new ideas or forms to the following generations; and finally the *individual*, who brings about some change in the domain, a change that the field will consider to be creative.

With reference to psychological environment, Rogers (1954) believes that by setting up conditions of psychological safety and freedom, creativity can be fostered and nourished. Rogers suggests that psychological safety may be established by accepting the individual's worth unconditionally, providing a climate in which external evaluation is absent and empathic understanding present. Isaksen (1987) says,

... necessary conditions for the healthy functioning of the preconscious mental processes which produce creativity: The absence of serious threat to the self, the willingness to risk; ... (and) openness to the ideas of others.

In addition to all of the above, other researches which link creativity to the environment include stimulating creativity through peer contact (Torrance, 1988b), nurturing creativity

with parental approval and contact (Miller and Gerard, 1979), creativity as a function of the interaction between personality and environment (Amabile, 1983a and Harrington, 1990) and the effect of particular social and physical environments on creativity (Getzels and Jackson, 1962; Klein, 1975 and Amabile, 1983b).

C. R. Rogers' (1954) words below clearly shows the interconnectedness of the four Ps of creativity. He says,

... the creative process [*process*] is that it is the emergence in action of a novel relational product [*product*], growing out of the uniqueness of the individual [*person*] on the one hand, and the materials, events, people, or circumstances of his life [*press*] on the other.

2.2 CREATIVITY AND EDUCATION

According to Torrance (1962), schools have cause for concern about the creative talent and creative growth of children, which stems from their legitimate and traditional concerns namely:

a) **fully functioning personalities.**

By this it is meant that the purpose of education has been to help all individuals towards the full development of their talents. In other words, to fully develop the intellectual capacities of the individual, creative thinking is a must.

b) **mental health.**

One's creativity is an invaluable resource in coping with life's daily stresses. In view of this and of the growing recognition of the importance of

education's role in preventing mental breakdown, delinquency, and severe maladjustment, schools have been asked to seek mental health goals.

c) educational achievement.

"Schools are for learning." The most effective way for children to learn is by creative means.

d) vocational success.

Creative thinking is important, even in jobs that appear to be quite mundane. Wallace (1961) discovered that creative thinking is important in success even in occupations such as selling in a department store. Notably creativity is a distinguishing characteristic of outstanding individuals in almost every field.

e) social importance.

Schools are the training grounds for students who will eventually become the pillars of society in the future. Students from schools ultimately make useful contributions to our society and to our national goals.

Besides this, our National Philosophy of Education (1989) states that,

Education in Malaysia is an ongoing effort towards further developing the potential of individuals ... Such an effort is designed to produce Malaysian citizens who are ... able to contribute to the betterment of the family, the society and the nation ...

If we acknowledge this as our educational aim, then developing creative talent should be education's most cherished goal.

Torrance (1972) also says that in order to prepare children to be able to better adapt to an ever-changing world, they should be taught how to use creative thinking skills. In addition, Toynebee (1934) states that, "To give a fair chance to creativity is a matter of life and death for any society" (Shallcross and Gawienowski, 1989).

Education encompasses the role of teachers, administrators and also specialists for example the counsellor. Although the role of specialists is a little different, they are still very important in nurturing creativity, especially in the highly creative child. For example guidance workers can encourage creative talent by (Torrance, 1962):

- 1 providing for highly creative children a refuge, a safe relationship.
- 2 serving as "sponsors" or "patrons" for certain highly creative children.
- 3 helping highly creative children understand and accept their divergence.
- 4 listening to the ideas of highly creative children.
- 5 recognizing creative talent and seeing that it is given a chance to develop.
- 6 helping parents and fellow workers understand the problems of highly creative children.

However, it is sad to note that on the whole, children are being denied their natural tendencies towards creative thought when they get into the education system. This depressing situation is clearly depicted by Torrance (1959) with his words, "I am convinced by what I have observed in elementary schools and from what I have learned from our data that much promising creative talent is needlessly killed by the coercive pressures of the peer group and of the institution of education itself."

In Malaysia a somewhat similar situation to that observed by Torrance exists. It was stated in 'The Gateway to Knowledge', an article in a local newspaper that:

Perhaps much of the problem lies in the country's education apparatus, from primary to tertiary level, which is too exam-oriented. Indeed the education process has been rendered into nothing more than cheerless rote learning. Students are not taught to think critically or creatively. Neither are they instilled with a compulsive need to acquire knowledge (New Straits Times, 12 November 1997).

The dire need to emphasize creativity is stated succinctly by Wilson (1959), "...Together with this increased emphasis on the need for creativity, there has been an effort to change the schools with the responsibility for the development of creativity."

Here in Malaysia too, there has been a concerted effort to incorporate thinking skills, which include creative and critical thinking into the existing curriculum. According to Datuk Dr. Abdul Shukor Abdullah, the Director General of Education of Malaysia (1999),

Malaysia's primary and secondary schools are moving away from content-oriented and memory-based learning designed for the average students to an education that stimulates thinking, creativity, ... The future classrooms are 'thoughtful' classrooms that promote children how to learn and how to think with information technology as enablers and the Smart Schools are leading the way.

2.3 CREATIVITY AND LEARNING

Before looking into the link between creativity and learning, a definition of learning is necessary. According to cognitive theorists', learning is the process by which organisms make relatively permanent changes in the way they represent the environment because of experience (Davis, 1992). It can be said that learning takes place when students' perception

of themselves and their surroundings gradually evolve resulting in a mental paradigm shift through the experiences they encounter in the classroom. Lessons in a classroom bring about change more effectively by promoting the deliberate development of creative thinking and problem-solving skills i.e. 'creative learning'.

An excellent definition for creative learning was advocated by Torrance and Myers (1970),

...Becoming sensitive to or aware of problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; bringing together available information; defining the difficulty or identifying the missing element; searching for solutions, making hypothesis, and modifying and retesting them; perfecting them; and finally communicating the results.

Besides this, Guilford (1977) advocates that problem-solving and creative thinking are linked to creative learning (Isaksen and Parnes, 1985).

According to Isaksen and Parnes (1985), Covington (1967) researched the effectiveness of creative learning and provided support for it being a central concern for education. Guilford (1970) also supported the view that schools are important environments to foster the deliberate development of creative learning.

Edwards and Springate (1995) have put forward the following with reference to how young children learn.

- Young children are developmentally capable of classroom experiences which call for **higher level thinking skills**, including analysis (breaking down material into component parts to understand the structure, seeing similarities and differences);

synthesis (putting parts together to form a new whole, rearranging, reorganizing); and evaluation (judging the value of material based on definite criteria).

- Young children want and need to express ideas and messages through many different expressive avenues and symbolic media. Young children form mental images, represent their ideas, and communicate with the world in a combination of ways. They need increasing competence and integration across formats including words. Through sharing, gaining others' perspectives, and then revising their work, children move to **new levels of awareness**. Teachers act as guides.
- Young children learn through **meaningful activities** in which different subject areas are integrated. Open-ended discussions and long-term activities bring together whole-language activities and artistic creation. Activities that are meaningful and relevant to the child's life experiences provide opportunities to assist children in seeing the interrelationships of things they are learning.
- Young children benefit from in-depth **exploration** and long-term, open-ended projects which are started either from a chance event, a problem posed by one or more children, or an experience planned and led in a flexible way by teachers (Edwards & Springate, 1993; Clark, 1994). Teachers act as resource persons, problem-posers, guides, and partners to the children in the process of discovery and investigation.

Treffinger (1980) says that creative learning is important because it helps learners to be more effective, creates possibilities for solving future problems and can produce great satisfaction and may lead to powerful consequences in our lives (Joseph, 1998). Therefore the teacher's role is to provide opportunities for meaningful activities and exploration so

that students are able to acquire higher level thinking skills and new levels of awareness. In this way creative learning takes place. All of the above holds true even for older children as supported by Isaksen and Parnes (1985), “There is also evidence for the effectiveness for this type of learning for older students” (Reese, Parnes, Treffinger & Kaltsounis, 1976).

In addition, Torrance and Harmon (1961) discovered that a ‘creative set’ encouraged students to use knowledge more creatively compared to learning through memorisation. Isaksen and Parnes (1985) also supported this view by stating that creative learning transcends mere recall and it provides students with the opportunity to synthesize and apply previously learned material to novel situations. Furthermore, creative learning does not discount the overall importance of information. On the contrary, information provides the raw material for learning and stresses the importance of using knowledge by focusing on analysis and synthesis (Isaksen and Parnes, 1985).

All this brings us back to the role of a teacher in the classroom. The teacher is a guide and mentor; the person who will help a student acquire the skills which are essential for him/her to function effectively in our ever-changing and information-rich society by way of creative learning. A teacher who is aware of and able to maximize the utilization of his/her own creative ability with the aid of specific creative techniques will definitely motivate students and hence enhance creative learning.

2.4 CREATIVITY AND TEACHING

First of all, Starko (1995) has made clear that there is a difference between creative teaching and teaching to develop creativity.

Starko (1995) says that creative teaching occurs when a teacher exercises considerable creativity in developing and presenting a lesson. A teaching activity that produces an enjoyable, or even creative, outcome does not necessarily enhance creativity on the part of the students unless they themselves have the opportunity for creative thinking. In classroom teaching teachers may use enormous personal creativity in developing activities that allow few opportunities for students to be original. Besides this, teaching aids and materials could also be very interesting and considered creative. In this case, the person who has created the materials has the opportunity to be creative and not the students.

The focus of teaching to enhance creativity on the other hand, is very different. Teaching for creativity gives students the opportunity to exercise creative thinking in the process of participating in an activity. When a teacher is teaching to enhance creativity he may very well be personally creative, but he must also be able to provide students the knowledge, skills, and surroundings necessary for their own creativity to emerge and grow.

All of the above is very distinctly depicted by Parnes (1967) in his view on creativity and teaching:

Although there is much emphasis on creative teaching (the imaginative use of materials - films, demonstration, etc. - by a teacher); relatively less emphasis is being placed on the deliberate development of creative behavior in the student. Teaching in ways that impart information more effectively and in a more interesting manner is, to me, not enough to qualify it as teaching for creative development. Teaching or supervising for the development of creative behavior taps the internal resources of the student through the use of any media that can be made available.

Besides this, Lowenfeld (1957) says that we need to make a distinction between the potential creativeness of an individual and his functional creativeness. Lowenfeld states

that potential creativeness is the creativeness an individual possesses but which has not necessarily been realized. An individual may not even be aware of this aspect of his personality as it may have been neglected, inhibited or buried in the process of "learning" or "maturation". Functional creativeness on the other hand is that part of an individual's creativeness which he uses, or which expresses itself in his work or actions. Therefore, there is an enormous range in the creativeness of individuals.¹ Some individuals have much greater potential abilities than others and the differences of the 'amount' of creativeness in individuals which actually functions gives rise to an almost infinite continuum from the least to the most creative.¹

Therefore,¹ it is of utmost importance that creative teachers be identified and be made aware of the extent of their own creative abilities and potential so that their knowledge, skills, abilities and attitudes to handle the creativity of the students under their care can be enhanced or improved.¹ Teachers themselves need to realize that their own minds work in creative ways and with proper training they would be able help motivate and develop students' minds.¹ "Every human mind is a great slumbering power until awakened by a keen desire and by definite resolution to do" (Mehr and Shaver, 1966). Whether directly or indirectly, when students become more motivated towards their studies, the conditions of classroom teaching and learning will improve. This is the ultimate reason for supporting creative teachers and the creativity of good teaching as creating a classroom that can nurture is the goal of a creative teacher. With reference to this, Torrance (1970) says, "...unless there is guidance and direction from a teacher, most children will cease to develop after a certain stage and will become discouraged. Creative ways of learning, in fact, call for the most sensitive kind of guidance and direction possible."

All in all, the success of a school system depends on the capabilities of its teaching force. Hence, in order to set the stage for creativity and innovation, the school system should encourage and support creative teachers and teaching in order to help teachers to actualize their own creative potential, effectively use their external resources and, make something happen within learners (Joseph, 1998).

2.5 MENTAL BLOCKS TO CREATIVE THINKING

Van Oech (1983) sees stimulating creativity as a matter of removing mental blocks. Davis (1992) postulates five main common barriers to creative thinking, which are listed below:

- ♦ habit
- ♦ rules and tradition
- ♦ perceptual blocks
- ♦ cultural blocks
- ♦ emotional blocks

All of the mental blocks to creative thinking mentioned above do in fact exist in the classroom situation. The task for everyone involved now is to change his/her mindset so that creativity can be stimulated for the betterment of the whole educational society.

2.6 TECHNIQUES OF CREATIVE THINKING

The techniques of creative thinking can be divided into two main sections namely, (1) personal creative thinking techniques and (2) standard creative thinking techniques.

Personal creative thinking techniques develop in the course of doing creative things or from instruction by people who use and understand such techniques. Creative people develop personal techniques irrespective of subject or content of a creation. These types of techniques involve analogical thinking, which includes borrowing, transferring, and modifying ideas and problem solutions (Davis, 1992).

Standard creative thinking techniques are meant to supplement one's ideas. Here, Davis (1992) proposes that the difference between intuitive creativity and forced creativity be considered. According to Davis (1992), intuitive creativity is the unpredictable inspirations that may or may not appear when and where you need them such as inspiration, intuition, and spontaneous creative thought. Forced creativity on the other hand is, when a person or group consciously decides to sit down and creatively attack a problem using one or more techniques to clarify the problem and generate creative ideas for it. The following techniques listed refer to forced creativity. These techniques were observed closely in this study, and therefore will be discussed at length.

2.6.1 Creative Problem Solving

Blissett and Megrath (1996), Guilford (1977) propounded that, "Creative thinking produces novel outcomes and problem solving involves producing a new response to a new situation

which is a novel outcome.” This statement shows that there is a definite link between creative thinking and problem solving.

Problem solving has two stages. There is a divergent, creative phase, which is followed by a critical convergent one. First a lot of ideas are generated while the problem is being explored, then they are narrowed down and linked to produce a fully worked out solution. In other words the manipulation of information is done to develop creative solutions to problems identified through the enumeration and evaluation of presented data.

Alex Osborn (1993) states that the Creative Problem Solving process comprises three stages namely fact-finding, idea-finding and solution-finding. These stages are further divided into two steps each. Schematically, the creative problem solving process can be summarised as follows.

The creative problem solving process

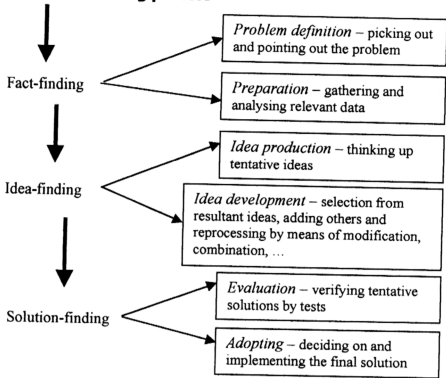


Diagram 2.4: Schematic Representation of The Creative Problem Solving Process as taken from *Applied Imagination: Principles and Procedures of Creative Problem-Solving* by Alex F. Osborn (1993)

Davis (1992) has summarized the six steps of creative problem solving based on Parnes' (1981) CPS model.

- Mess finding
- Data finding
- Problem finding
- Idea finding
- Solution finding
- Acceptance finding

Besides the above, Davis (1992) has confirmed that Parnes' CPS stages may be used to guide a creative thinking session in the classroom. Using CPS students can (1) learn effective creative problem solving strategies, (2) improve their understanding of the creative process, (3) be exposed to rousing creative thinking experiences and (4) solve problems.

An extension to Parnes' CPS model is Simplex (Basadur, 2002). Simplex sees creativity as a continuous cycle where completion and implementation of one cycle leads straight to the next cycle of creative improvement. "It is represented as a wheel to reflect the circular, perennial nature of problem solving" (Potworowski, Felio and Palmer, 2002). The Simplex process uses the following eight stages.

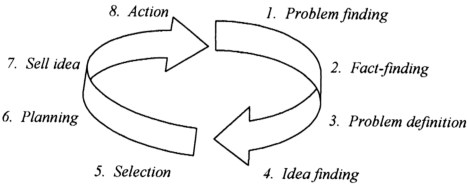


Diagram 2.5: The Simplex Process by Min Basadur (2002)

2.6.2 Question Technique

Dr. Frank Kingdon says that "Questions are the creative acts of intelligence" (Osborn, 1953). Basically the Question Technique is a way to induce imagination or to spur ideation. The methodology of the Question Technique is as follows:

- Isolate the subject or problem
- Ask a series of questions about each step in that subject or problem
- Question for a creative problem

Osborn (1963) advocated idea-spurring questions as listed below.

Osborn's (1963) 73 Idea-spurring Questions

- *Put to other uses?* New ways to use as is? Other uses if modified?
- *Adapt?* What else is like this? What other idea does this suggest?
- *Modify?* New twist? Change meaning, colour, motion, sound, colour, form, and shape? How can this be changed for the better?
- *Magnify?* What to add? More time? Greater frequency? Stronger? Higher? Longer? Thicker? Extra value? Plus ingredient? Duplicate? Multiply? Exaggerate?
- *Minify?* What to subtract? Smaller? Condensed? Miniature? Lower? Shorter? Lighter? Omit? Streamline? Split up? Understate?
- *Substitute?* Who else instead? What else instead? Other ingredient? Other material? Other process? Other power? Other place? Other approach? Other tone of voice?
- *Rearrange?* Transpose positive and negative? How about opposites? Turn it backward? Turn it upside down? Reverse roles? Change shoes? Turn tables? Turn other cheek?
- *Combine?* How about a blend, an alloy, an assortment, an ensemble? Combine units? Combine purposes? Combine appeals? Combine ideas?

The Question Technique can be carried out for self-interrogation or in group discussions in the classroom. The researcher feels that without the utilisation of the proper Question Technique, group discussions would be less organised and may not extract the required information necessary for problem solving.

An Idea Checklist can be used together with Osborn's idea spurring questions to directly or indirectly suggest solutions for problems. In principle an Idea Checklist is not a technique but is more of a tool. An Idea Checklist pushes the imagination into new idea combinations and new solutions to problems. Checklists help enormously in keeping the idea maker or problem solver alert to multiple aspects of the issue at hand (Harris, 2002).

2.6.3 Brainstorming

The term brainstorming has become a generic term for creative thinking. According to Wilson (1997), the best general explanation for brainstorming comes from Wilfred A. Peterson's book entitled *The Art of Creating Thinking*,

...Brainstorming is an existing process by which individuals strive to stimulate and inspire each other to create ideas. The purpose is to tap the subconscious mind of each member in a group and create a mutual sharing of mental wealth of those participating. Through the mechanism of association, one idea will suggest another and another ... creating a chain reaction. ...It can be used by everyone ... Brainstorming is thinking-together, harnessing imaginative power. It is mental teamwork, going into a creative-huddle. It can be used by family members to create harmony in the home or by statesman to create a peaceful world.

Alex Osborn (1963) was the originator of the technique of brainstorming. This technique is used to generate a large number of diverse ideas and responses. Brainstorming is also an

excellent way of developing many creative solutions to a problem. It utilises the lateral thinking process, as its main goals are to break us out of our habit-bound thinking and produce a set of ideas from which we can choose. Studies by Parnes & Meadow (1959) and Turner and Rains (1965) have shown that brainstorming has in actual fact proved effective in increasing scores on divergent measures of creativity (Joseph, 1998).

This technique can be carried out individually or in a group. Individual brainstorming will produce a wider range of ideas than with group brainstorming, as there is no worry about other people's egos or opinions. Osborn (1963) himself stated, "Despite the many virtues of group brainstorming, individual ideation is usually more usable and can be just as productive." However, ideas may not be developed as effectively as the individual does not have the experience of a group to help him/her. Group brainstorming on the other hand can be very effective as it uses the experience and creativity of all members of the group. When individual members reach their limit on an idea, another member's creativity and experience can take the idea to the next stage. Group brainstorming therefore tends to develop ideas in more depth than individual brainstorming. In his book *Serious Creativity* (1992), Edward de Bono states that individuals are much better at generating ideas and fresh directions. Once the idea has been born then a group may be better able to develop the idea and take it in more directions than the originator.

Harris (2002) stipulates that the basic guidelines for a brainstorming session are:

- Defer judgment
- Think freely

- Tag on
- Quantity of ideas is important

In short, brainstorming is an idea generating technique, which breaks us out of our habit-bound thinking and produces a set of ideas from which we can choose. It is useful for addressing specific problems and where a collection of good, fresh, new ideas is needed. This technique is applicable in the classroom situation.

Another technique that is more specific for generating new ideas and can be used within a Brainstorming session is Attribute Listing. Robert Crawford (1978), the designer of this technique stipulates that "Each time we take a (creative) step, we do it by changing an attribute or quality of something, or else by applying that same quality or attribute to some other thing." Hence, Attribute Listing is therefore both a theory of the creative process and a practical creative thinking technique (Davis, 1992).

Michael Morgan (1993) says that Attribute Listing is a great technique for ensuring all possible aspects of a problem have been examined as it focuses on the attributes of an object, seeing how each attribute could be improved.

According to Professor Robert P. Crawford (Osborn, 1993), first one has to list the various attributes of an object or idea. Then attention is given specifically to each one of these attributes and finally using these attributes as a checklist, one is forced to look at all aspects of a problem. This is what Davis (1992) has identified as attribute modifying. The other type of Attribute Listing is attribute transferring or analogical thinking. Barron emphasizes the significance of Attribute Listing by stating,

... the ability to change things ... is central to the creative process. New forms do not come from nothing, not for us humans at any rate; they come from prior forms, through mutations, whether unsought or invited. In a fundamental sense, there are no theories of creation; there are only accounts of the development of new forms from earlier forms.

Dr. Fritz Zwicky and Dr. Myron S. Allen (Osborn, 1993) are credited with Morphological Analysis. This technique is an extension of attribute modifying coupled with forced relationships. Charles S. Whiting (Osborn, 1993) defines forced relationships as "techniques for inducing original ideas which rely upon the creation of a forced relationship between two or more normally unrelated products or ideas as the starting point for the idea-generation process."

Here, attributes or dimensions of a problem are automatically combined into new combinations using different axes to form a matrix. Morphological Analysis is also known as Matrix Analysis in the business world. 'Matrix Analysis' is used to generate new approaches, using attributes such as market sectors, customer needs, products, promotional methods, etc.

Morphological Forced Connections is another application of attribute listing and is described by Koberg and Bagnall in their book *The Universal Traveller* (1974). According to the authors, this is a 'foolproof invention-finding scheme'. This technique works in the following way:

- List the attributes of the situation.
- Below each attribute, place as many alternates as possible.

- When completed, make many random runs through the alternates, picking up a different one from each column and assembling the combinations into entirely new forms of the original subject.

Six Thinking Hats is an important and powerful technique for looking at the rounded view of a situation by forcing you to move outside your habitual thinking style. It opens up the opportunity for creativity within decision-making. The creator of this technique Edward de Bono (1985) emphasizes, "The six-hats method is really an attention-directing tool, because it directs our attention towards certain aspects and towards a certain type of thinking." According to De Bono (1992),

...in our thinking we often try to do too much at the same time and sometimes get confused. The Six Thinking Hats is a method for doing one sort of thinking at a time. Instead of trying to do everything at once we 'wear' only one hat at a time.

Although the focus of this technique is more on business decision-making, it still can be used as an aid to other techniques such as Brainstorming.

Subsumed under the umbrella of brainstorming is mind mapping. What is a Mind Map? The definition given by Tony Buzan (2000) in *The Mind Map Book* is, "The Mind Map is a powerful graphic tool that harnesses the full range of cortical skills – word, image, number, logic, rhythm, colour and spatial awareness – in a single, uniquely powerful technique." It can improve learning and promote clearer thinking to enhance human performance. "Mind Maps can be used to develop creative intelligence and is the ultimate creativity enhancing thinking tool" (Buzan, 2001). Buzan (2000) acknowledges,

The Mind Map was originally a memory technique. It evolved naturally into a creative and multi-purpose thinking technique with the theoretical support of Sperry's brain research and the investigations of Torrance et al into creativity.

In his book *Use Both Sides of Your Brain*, Buzan (1990) stipulates that summarizing information, consolidating information from different research sources, thinking through complex problems, and presenting information that shows the overall structure of a subject is best done using association of keywords, and not in a linear, written form. Therefore, when a Brainstorming session is being conducted, it is beneficial to use a Mind Map as a tool to itemise all the ideas that are generated.

2.6.4 Synectics

"From the Greek, the word Synectics means the joining together of different and apparently irrelevant elements" (Gordon, 1961). William J. J. Gordon who set forth three fundamental precepts of synectic theory advocated this technique. The precepts are:

- Creative output increases when people become aware of the psychological processes that control their behaviour.
- The emotional component of creative behaviour is more important than the intellectual component.
- The emotional and irrational components must be understood and used as precision tools in order to increase creative output.

The Synectic technique helps a person look at, what appears on the surface as, unrelated phenomenon and draw relevant connections. It is a way of mentally taking things apart and putting them together to furnish new insight for all types of problems. This technique's main tools are analogies or metaphors and its characteristics are:

- Synectics is based on the fusion of opposites
- Synectics is based on analogical thinking
- Synectics is synergistic meaning that its action produces a result that tends to be greater than the sum of its parts

The Synectic process involves (1) making the strange familiar and (2) making the familiar strange (Gordon, 1961).

In *making the strange familiar*, the first step is the analytical phase where a problem is understood. In order to make the strange familiar, a problem has to be analysed. Then any strange thing or concept from the problem is compared in the mind to previously known data and subsequently the strangeness is converted into familiarity. "When faced with strangeness the mind attempts to engorge this strangeness by forcing it into an acceptable pattern or changing its private geometry of bias to make room for the strangeness" (Gordon, 1961).

There are four mechanisms for *making the familiar strange* namely, (1) personal analogy (2) direct analogy (3) symbolic analogy and (4) fantasy analogy. In **personal analogy**, an individual identifies personally with the elements of a problem. The **direct analogy**

mechanism describes the actual comparison of parallel facts, knowledge, or technology. Gordon (1961) says that the diversity of backgrounds among group members provides the richness essential for the successful application of this mechanism. **Symbolic analogy** uses objective and impersonal images to describe the problem. In this mechanism, aesthetically satisfying mental images can be formed as a compressed description of the elements of a problem although they may be technologically inaccurate – symbols without words. The last mechanism, the **fantasy analogy**, is a way for an individual to think of fantastic, way-out and perhaps ideal solutions to a problem. “When a problem is presented to the mind, it is most useful to imagine the best of all possible worlds, a helpful universe permitting the most satisfying possible viewpoint leading to the most elegant of all possible solutions” (Gordon, 1961).

In the classroom, Synectics can be used to widen students’ understanding of a particular topic or issue, develop students’ ability to think creatively and enhance creative thought. Teacher-facilitators can use Synectics in the classroom by leading students to describe the topic, create direct analogies, describe personal analogies, identify compressed conflicts, create a new direct analogy, and reexamine the original topic (Gunter, et. al., 1990).

Besides synectics, there is De Bono’s (1992), OPV or Other People’s Views. This is an attention-directing tool designed to broaden perception. The OPV is used to consider the thinking of both sides in an argument or conflict. The OPV is always concerned with what other people actually think at a specific moment. Therefore, it is about the specific views of other people. One has to put oneself in the shoes of these other people to think and feel as they do. This effort to see the other point of view or other perception of the situation must be objective (De Bono, 1992).

On the whole, all these creative thinking techniques have one thing or function in common. All these techniques advocate divergent thinking together with the deferment of judgment in order to generate a greater volume of unrestrained ideas.

After careful consideration of all the parameters of each technique, four main creative techniques were selected for this study i.e. creative problem solving, question technique, brainstorming, and synectics. These creative techniques were found to be most suitable to the requirements of this research.

2.7 DIMENSIONS OF CREATIVE THINKING

According to Guilford (1959), the dimensions of intellect can be organized into a meaningful structure, as depicted below.

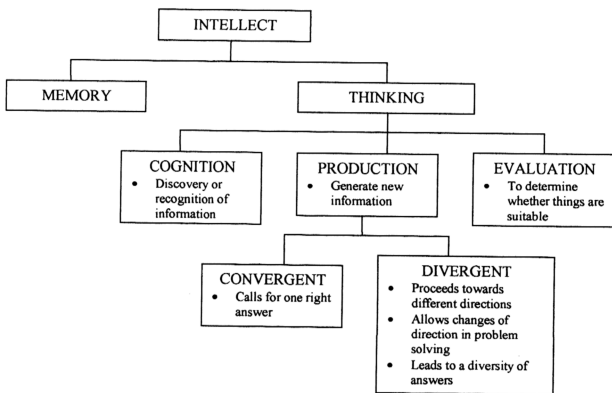


Diagram 2.6: Graphic representation of the dimensions of intellect as taken from *Personality* by J. P. Guilford (1959).

Guilford (1967) says that divergent production is of prime importance and is a prerequisite for creativity plus is critical for creative behaviour. Guilford (1967), who is supported by Torrance (1966), further reiterates that there are four dimensions stemming from the divergent processes. These are fluency, flexibility, originality, and elaboration. In order to accentuate these dimensions, techniques of creative thinking are utilized to obtain optimum results. The respondents of this study were observed closely for these dimensions and therefore, they shall be described in detail at this juncture.

2.7.1 Fluency

Fluency is the ability to generate or produce a large quantity of possibilities, ideas, consequences, or products in a short period of time. "This is a quantitative aspect that has to do with fertility of ideas" (Guilford, 1959). Fluency can further be subdivided into word fluency, associational fluency, expressional fluency, and ideational fluency.

Thurstone (1938) was the first to report on word fluency. **Word fluency** measures the factor known as divergent production of *symbolic units* (i.e. signs of an information item). A person who has word fluency can easily state words containing a given letter or combination of letters as rapidly as possible. **Associational fluency** measures one factor of divergent production of *semantic relations* (i.e. meaning connecting one information item to another). In layman's terms, associational fluency is the ability to produce as many synonyms for a given word in a limited time. **Expressional fluency** measures the factor known as divergent production of *semantic systems* (i.e. meaning of three or more organised information items). It is the ability to produce with efficiency appropriate verbal expressions of organized thought. Simply put, a person who has the ability of expressional fluency can easily write well-formed sentences with a specified content. The ability to produce with efficiency many ideas, which fulfill meaningful specifications, is **ideational fluency**. It measures the factor known as divergent production of *semantic units* (i.e. meaningful information items). The emphasis here is on quantity rather than the quality of ideas expressed.

The creative techniques of creative problem solving, brainstorming, question technique and even synectics can be used to enhance fluency and to produce an abundance of ideas be it

ordinary or bizarre with the aid of deferred judgment so as not to throw a wrench into the idea production cogs.

2.7.2 Flexibility

Flexibility is the ability to view something in many different ways with a variety of ideas or products. Flexibility of thinking allows a person to easily abandon old ways of thinking and adopt new ones. Flexibility can further be subdivided into spontaneous flexibility and adaptive flexibility.

According to Guilford (1959), **spontaneous flexibility** is the ability to produce a *diversity* of ideas when free to do so without the limitations of 'perseveration' or rigidity in thinking. Another example of spontaneous flexibility is the tendency to see *rapid alternations* when dealing with concrete material. **Adaptive flexibility** facilitates the *solution* of problems (Guilford, 1959). An adaptive flexible person can give up one perceived path in order to see another and/or has the ability to restructure a problem or a situation when necessary.

Creative techniques, which promote the ability of flexibility, are brainstorming, synectics and creative problem solving.

2.7.3 Originality

Originality is the ability to produce unusual, unique, or highly personal responses, ideas, or solutions. A person who is considered original can form associations between elements that are remote from each other in time, or remote from each other logically. Besides that,

their responses are judged to be clever. In a nutshell, originality is the ability to produce statistically uncommon or clever responses (Guilford, 1959).

Originality can be induced using the creative techniques of the questioning technique and synectics.

2.7.4 Elaboration

This is the ability to expand and embellish ideas with intensive detail. Elaboration involves the ability to supply details to complete a given outline or skeleton form. This ability is linked to planning as it refers to the specification of details that contribute to the development of an idea or the variations of an idea (Guilford, 1959).

To improve this ability the creative techniques of brainstorming and the question technique are applicable.

2.8 MEASURES OF CREATIVITY

To date, it can safely be concluded that there still is no one single measure of creative thinking that can be used to measure creativity comprehensively. Since the definition of creativity is so diverse encompassing the four Ps, therefore the measures of creativity follow suit. In addition, Brown (1989) has noted that as there is not much agreement on what is to be measured in creativity literature, hence how it should be measured is also a question mark. Moore (1982) has also verified that there is no consistency in identifying

creativity with the existing measures of creativity. Some of the measures of creativity which are available are as follows.

In 1962, Getzels & Jackson devised 5 types of creativity tests. These tests measured the ability to

- make associations,
- list uses for common objects,
- find hidden shapes and figures in patterns,
- give different types of endings to stories and
- make up problems.

Then Wallach and Kogan (1965) championed an untimed, game like procedure of test administration. This procedure contains measures representing creative tendencies that are similar in nature. It is not practical in typical school conditions and would not be acceptable to a great majority of teachers and school administrators (Torrance and Ball, 1984). This is most probably due to time constraints.

Next Mednick and Mednick (1967) designed the Remote Associates Test (RAT). In this test Mednick assumes that ideas are to be linked together with varying degrees of strength in a vast associative network. The more weakly connected two combined ideas are, the more original they will actually be in combination. This test contains 30 items comprising 3 words that are mutually remote. The participants' task is to produce a fourth word that is a common associate of all 3 remote words. Being a measure of the ability to think

creatively, this test is widely used with graduate and professional students in the United States of America.

At the same time, Guilford (1967) developed the word association test, which is related to divergent production abilities of the Structure of Intellect Model (Khatena, 1978). In Guilford's Structure of Intellect Model, intelligence is viewed as comprising five operations, six products and four contents. Each operation consists of 24 abilities (i.e. 6 products x 4 contents). Guilford's Creativity Tests for Children were open-ended, creative-response type tests comprising 10 tasks. The first 5 tasks are verbal whereas the other 5 tasks are non-verbal with each task measuring one out of ten of the identified 24 divergent production abilities.

According to Torrance and Ball (1984), over a period of 25 years, Torrance and his associates (Torrance 1962, 1966, 1974) developed several batteries of test activities for use in all cultures, from kindergarten through graduate and professional school. The Torrance Tests of Creative Thinking (TTCT) uses activities that are models of the creative thinking process, each involving different kinds of thinking. TTCT, a timed test, measures the 4 dimensions of creativity namely fluency, flexibility, originality and elaboration, and consists of verbal and figural measures. The verbal measure consists of 7 tasks and the figural measure consists of 3 tasks. However, although the TTCT is considered the most widely used standardized measure of creativity, many educators who are interested in understanding the creative functioning and potentialities of children and adults have hesitated to use it. This is because mastering the standardized scoring requires a lot of time and energy and it places too much emphasis on fluency and other divergent thinking abilities and does not capture the essence of the creativity elicited by the test tasks.

Next, is the Khatena-Torrance Creative Perception Inventory (KTCPI). This model was devised on the premise that an individual, who perceives himself as creative, is a person who can be expected to behave in creative ways (Khatena, 1977). It comprises two measures of creative perceptions where both consist of 50 items each and can be easily administered and interpreted.

The first measure 'What Kind of Person Are You?' (Torrance & Khatena, 1970) is based on the rationale that the individual has incorporated creative and non-creative ways of behaving into a psychological self (Khatena, 1977). What Kind of Person Are You? (WKPAY), consists of 5 factors (Bledsoe & Khatena, 1974) namely:

- acceptance of authority
- self-confidence
- inquisitiveness
- awareness of others
- disciplined imagination.

The second measure 'Something About Myself' (Khatena, 1971) is based on the rationale that creativity is reflected in the personality characteristics of the individual, in the kind of thinking strategies he employs, and in the products that emerge as a result of his creative strivings (Khatena, 1977). Something About Myself (SAM) has 6 factors (Bledsoe & Khatena, 1973) such as:

- environmental sensitivity
- initiative
- self-strength
- intellectuality
- individuality
- artistry

Both WKPAY and SAM of the KTCPI have been used to identify creative perceptions and orientations of various groups of adolescents and adults both in the United States and abroad (Khatena, 1977). In Malaysia, Palaniappan (1994) has validated the KTCPI and found that it is reliable to be used in the local context. Besides this, these two checklists serve to identify candidates for creativity programmes.

In addition to all of the above, there are many other measures of creativity that have been used with some success. One of them is the Kirton Adaptation-Innovation Inventory (Kirton, 1976). This is a 32 self-report instrument, which measures creative style. Based on a preference for an adaptive or innovative style of problem solving, creativity and decision-making, an individual is placed on a continuum using the scores obtained using this measure. The Hepper & Peterson's (1982) Problem Solving Inventory, which taps 3 components of interpersonal problem-solving style such as problem-solving confidence, approach-avoidance style and personal control. This self-report measure has 35 items. Then there are two measures that subjects can check as self-descriptive or leave blank; the Creative Motivation Scale (Torrance, 1984) and the Creative Personality Scale of the Adjective Checklist (Gough and Heilbrun, 1983). The former is a 28 true-false scale whilst

the latter is a 300-item checklist. The Style of Learning and Thinking is another measure of creativity. This measure attempts to measure creativity utilizing cerebral hemispheric functioning. Last but not least is the measure of Thinking Creatively with Sounds & Words (Khatena & Torrance, 1981; Torrance, Khatena & Cunningham, 1990). This measure (TCSW) is a battery of two tests, Sounds and Images and Onomatopoeia and Images. The TCSW battery measures the originality of responses to abstract sounds and onomatopoeic words.

Besides all these measures of creativity mentioned, there are many other measures of creativity that are related to self-perception, achievement, creative product and personality. However, the reliability and validity of most of them have not been verified.

With reference to the parameters for each measure mentioned above, it was found that the measure SAM of the KTCPI best fit the objectives of this study.

In conclusion, the researcher hopes that all that has been discussed in this investigation will add on to the existing literature in the field of creativity on the local scene.