THE EFFECTS OF PSYCHOMOTOR REHEARSAL AND GUIDED IMAGERY ON SKILL DEVELOPMENT AND CREATIVITY IN STUDENT CERAMIC ART FORMS

by

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B.Ed., University of Victoria, 1978

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS (EDUCATION) in the Faculty of Education

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SIMON FRASER UNIVERSITY

December 1986

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THE EFFECTS OF PSYCHOMOTOR REHEARSAL AND GUIDED IMAGERY ON SKILL

DEVELOPMENT AND CREATIVITY IN STUDENT CERAMIC ART FORMS

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This thesis investigates the role of psychomotor rehearsal and associated imagery on student skill development in ceramics and the production of ceramic art forms. Qualitative assessments of subjects' work by expert judges yielded empirical data for analysis. This involved comparison of results of assessments of ceramic art forms by control and experimental groups. All subjects received the same instruction with the exception of the experimental group, which received psychomotor rehearsal through guided imagery. The experimental variable for the purpose of data analysis was psychomotor rehearsal.

Evaluations were made of the following: production of a before-skills training ceramic pinch pot; production of an after-skills training ceramic pinch pot; and finally the level of creativity exhibited by the after-skills training pinch pot tri-animal. The tri-animal was an art form constructed from three different animal parts. Evaluation was administered by a panel of judges considered expert in the field of student ceramic art. The evaluation data were arrived at through the application of a criterion referenced scale for both pinch pot skill development and creativity, and were subjected to t tests.
Significant differences (p < 0.05) were found between the experimental and control group in all three evaluations.

The data therefore supported the hypothesis that psychomotor rehearsal improved skill development for ceramic art forms and that guided imagery aided in the creative formation of new associations and ideas.
DEDICATION

To my husband Peter,
my dad,
and the boys and girls who participated in this study.
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CHAPTER ONE

Introduction

This study is designed to investigate the benefits of psychomotor rehearsal on ceramic skill development and to validate the association of imagery in creative functions, specifically the production of ceramic art forms.

The idea for this study evolved over a ten year period of observation and work with elementary school students, much of it involving the use of what is referred to as guided imagery. Prior to the research study, the researcher used guided imagery with elementary school age students in a number of ways: to formulate and to solve mathematical problems; to develop hypotheses and to solve experiments in science; to role play historical and economic situations in social studies; to write stories and poems; and to draw and to paint. For each of the preceding guided imagery sessions a scenario, specific to its content, was written. These scenarios were largely teacher directed, although some students did write scenarios for role play in drama and social studies, and for mathematical problems. All scenarios were read to the students, who were encouraged to be in a relaxed state. The researcher incorporated statements in each scenario which reflected an experience from each of the sensory modalities which helped to produce the image. This encouragement of the use of guided imagery resulted in a flow of imaginative ideas and
an keen interest from the students.

This enthusiasm from the students and the researcher's curiosity about imagery led to this study. The fields of psychology and education have begun to focus on imagery with greater interest. Imagery has undergone the scrutiny of psychologists, psychotherapists, scientists and researchers especially in the last two decades. Artists, writers and musicians have worked with imagery for centuries. There are many arguments concerning its definition and function. These will be discussed in more detail in Chapter Two. A general outline of definitions relevant to this study follows. The researcher chose to define imagery as an internal representation evoked by a physical stimulus or some internal activity. An image is a specific representation with imagery being a series or collection of image experiences. Finally, imagining is the active process of mental imagery as a function that interacts with other cognitive functions.

It is this interaction that brought psychotherapists to the threshold of imagery and free association as a means of helping their patient's problems. Rather than trying to analyze free association images, psychotherapists developed scenarios for their patients to react to, enabling a much more focused analysis of the patient's image and its subsequent meaning. These scenarios have several names, but the researcher has chosen 'guided imagery' as the term which defines the process of guiding the image formation of patients or subjects.
Subjects were frequently requested to rehearse in their minds, various physical situations or events to overcome a problem. For example a person with a fear of walking by a steep cliff will be guided through such a situation so that when confronted with it in reality they would be better able to cope with it. This process is called psychomotor rehearsal.

Psychomotor rehearsal or mental practice is the process of mentally practicing a physical skill. Several studies have been carried out to see the effects of mental practice on the performance in a variety of sports: skiing, basketball and jumping to name a few. A summary of these studies is found in Chapter Two along with a discussion of imagery in creativity and learning.

The development and understanding of the role of imagery in creativity and learning has increased in the past decade, however the effects to date for art education have been minimal. This has been due in part to the lack of interest or even knowledge on the part of many researchers about art and the connections artists regularly make between imagery and creativity and learning.

It is believed that through the use of imagery and creativity changes in behavior can be observed. Accordingly assessments and comparisons of control group and experimental group ceramic art forms were carried out. These were made at three different stages in the study: the first was made of the before-skills training ceramic pots; the second was the after-skills training ceramic pot tri-animal; and
the third, for creativity of the after-skills training ceramic pot tri-animal. The assessments were carried out by a panel of three judges who are all considered expert in the field of ceramic art forms made by school age students. The comparison instruments, methodology and administration of the study are discussed in Chapter Three.

The results of the comparisons indicated that the experimental group displayed a significant difference from the control group for all three analyses. A summary of these results is presented in Chapter Four.

Conclusions from the research study are presented in Chapter Five, along with a discussion of educational implications.
CHAPTER TWO

Imagery and Knowledge

In order to address the key issues of this research study, a clarification and definition of terms is necessary. The mental image is considered crucial to the functioning of psychomotor rehearsal and is discussed with respect to its function and role in learning and creativity as presented by psychologists, psychotherapists, educators and researchers. A discussion of psychomotor or kinesthetic imagery, guided imagery and creativity follows to provide a framework of discussion for the interplay of imagery and learning within the creative act.

The term 'mental image' has often been referred to as 'picture in the mind's eye,' and evokes the notion of a mental representation of an external object in one's mind. This representation has sensory connotations and is referred to as an image. This image may be evoked through any one or combination of the following sensory modes: tactile, visual, auditory, gustatory and olfactory. Theorists, like Richardson include movement as one of the above sensory experiences. An image can result from any one or combination of these sensory modes of input or experience.

The "experience which reproduces or copies in part, and with some degree of sensory realism, a previous perceptual experience in the absence of the original stimulus"\(^1\) is Warren's definition of a mental
image. An image and perception can possess the same level of intensity, as evidenced in eidetic and synaesthesic studies carried out by Luria\textsuperscript{2} and Richardson\textsuperscript{3}.

The nature of mental imagery is difficult to ascertain empirically since it is produced through an internal process. Psychologists like Yuille, have seized upon this fact and attack imagery research in a manner exemplified by the following:

The current crisis in imagery research stems from the weak theoretical concepts which characterize the field. For the most part, definitions of imagery seem to be based on intuitive notions of mental processes, and the interpretation of research results appears to originate from the same intuitive source. This is not an argument that intuition is not a useful heuristic but rather than it is not a significant basis for an empirical science. What is required... is a solid definition of imagery, and its relationship to other cognitive functions.\textsuperscript{4}

This can be criticized as a specious argument. Yuille dismisses the current theoretical concepts of imagery as being weak on the grounds that he does not see the need for a conceptual framework for imagery of the mind but rather for the results of the mind's activities. In contrast, the Gestalt, environmental and interactive models of Arnheim,\textsuperscript{5} Neisser\textsuperscript{6} and Piaget\textsuperscript{7} provide a strong constituent for a theoretical concept of imagery.

Arnheim's conception of an image is similar to a percept "in the sense that both are abstractions of important visual features in the environment."\textsuperscript{8} The image is a record of the mind's activity in
structuring significant visual information and exists at many levels of abstraction. This is discussed in more detail below. Neisser⁹, a cognitive psychologist, supports Arnheim's view of the importance of imagery in perception and the function of the image in thought. He believes that imagery is between perception and memory, and that imagery is a process of actively constructing knowledge about the world. This process, according to Neisser, relies partly on stored information which is not only retrieved but also is reworked, analyzed or abstracted by the functioning of the brain, to form a new representation, thus structuring new data. For Piaget¹⁰, images are symbols which are necessary for thought. He asserts that a symbol can be characterized as a semiotic function since it encompasses arbitrary and social signs, motivated 'symbols' (resemblance between symbolizer and symbolized), individual 'symbols' (symbolic play, dreams, etc.) and social symbols. Without this semiotic function thought could not be formulated, and consequently could not be expressed intelligibly either to others or to oneself (internal language, etc.).¹¹

Images are necessary to complete this semiotic function as language cannot fulfill this role and Piaget supports this premise with two reasons. Firstly, that language is too abstract and results in a multitude of personal images even when the term is strictly defined and identical in vocabulary from one person to another. An example would be the term 'whole number' which, when given to a class of college students resulted in a plethora of visual images. Secondly,
Piaget believes that, "Language in the cognitive sphere can only designate concepts (classes, relations, number, propositional connectives or truth function, etc.) or individuals, and these only in terms of singular classes or relations (my father, Edward VII, etc.)." There is still that vast amount of knowledge which historically and currently can be perceived, that must be augmented with a system of imaginal symbols to fully realize the thought meaning. Piaget summarizes by saying,

The image, then, is a symbol in that it constitutes the semiotic instrument necessary in order to evoke and think what has been perceived....Words, then, merely designate conceptual articulations...the image...designates the object itself with its perceptual details and its concrete figural characteristics.

Therefore, one could possibly infer not only that imagery is necessary but also that it plays an important part within the larger cognitive system.

Arnheim concurs with Piaget's arguments as to the place of language in the formulation of thought and the importance of imagery on thought. Arnheim establishes a conceptual framework for imagery which is discussed further below.

Yuille makes claims that empirical science can only accept what it can establish by observation. Tacit knowledge, as supported by Polanyi is acceptable even though it cannot be verified. He believes that thinking is a conceptual process which begins with an
understanding of the Gestalt. Polanyi views the Gestalt as the outcome of an active shaping of experience performed in the pursuit of knowledge. This shaping or integrating I hold to be the great and indispensable tacit power by which all knowledge is discovered, once discovered, is held to be true. The structure of Gestalt is then recast into logic of tacit thought, and this changes the range and perspective of the whole subject....These are manifested in the tacit power of scientific and artistic genius.14

Polanyi believes that knowledge involves two kinds of knowing, a knowing of content and a knowing of process; these "aspects are similar in structure and neither is ever present without the other."15 One assumes that knowledge therefore has a functional relationship. Polanyi believes that one's knowledge of reality is a comprehensive action. What is comprehended, as well as the act of comprehension are seen to be similar in form. For Polanyi, this forms a relationship between a general notion and its specific characteristics. He views it as being "two levels of reality, the higher one controlling the marginal conditions left indeterminate by the principles governing the lower one."16 The reality of our external world is established by one's perceptions of it. These perceptions give one clues to the limitless aspects of reality which are unconstructed in our minds. It is this level of knowing more than we can tell, that Polanyi describes as the 'tacit dimension of knowledge'.

The non-literal meaning that Polanyi has presented in explanation of knowledge consists partly of feelings, emotions, desires,
compulsions, myths, religion and fantasy. Neurobiological investigation has so far failed to find physiological correlates for these things, in which case, an empiricist like Yuille cannot be satisfied. The search for meaning is present in man's artistic work, therefore, the researcher assumes that knowledge is not only represented through the articulation of thought, both in imaginal and verbal form, or verified through experiment, but also is presented in a dimension of knowing, a non-discursive form, that of imagery.

In view of this, the criticisms of such an empiricist as Yuille, appears too dismissive. Imagery describes the mental materials that the mind uses in its workings. Arnheim and Polanyi suggest that there is some kind of internal material which deals with the materials of thought. Arnheim calls it imagery, but regardless of what it is called, the mind is using some form of material and this is the weakness of Yuille's arguments. As an artist who works in images, the researcher would have to deny her own values of artistic meaning to support the previous statements of this empiricist. In its search for verifiable evidence for the existence of imagery, scientific empiricism has not yet been convincing. Has imagery a functional role in thinking or is it an epiphenomenal subsidiary to percepts? These are questions scientists ask, but not artists. Artists merely accept that imagery exists and create artistic forms which represent their imagery. Gordon supports this view by stating,
Through the arts he (man) has discovered a language which least distorts the original message and which is as closely analogous to the essential nature of the original message...art can never do it perfectly....For the work never is and never can be the exact match of the internal image in all its qualities and characteristics.\textsuperscript{17}

Eisner supports this view and indicates further that there should not be a distinction between qualitative and quantitative forms of research since all forms of empirical research "describe, interpret, predict and control qualities."\textsuperscript{18} The difference should be between what is studied scientifically and what is studied artistically. Eisner states,

Artistic approaches to research are less concerned with the discovery of truth than with the creation of meaning. What art seeks is not the discovery of the laws of nature about which true statements or explanations can be given, but rather the creation of images that people will find meaningful and from which their fallible and tentative views of the world can be altered, rejected or made more secure. Truth implies singularity and monopoly. Meaning implies relativism and diversity. Truth is more closely wedded to consistency and logic, meaning to diverse interpretation and coherence.\textsuperscript{19}

Introspective and anecdotal evidence for mental images is quite robust. There are scientists such as Shepard\textsuperscript{20} and Bugelski\textsuperscript{21} who propose within an empirical framework that imagery does in fact occur. Many scientists, writers, cognitive psychologists and artists have confessed to the effects of their internal images on their work.

Shepard\textsuperscript{22} recounts the role of imagery in the works of a variety
of people whose achievements are notable: Michael Faraday and his conception of electric and magnetic force fields; James Clerk Maxwell and propagation of electromagnetic waves; Albert Einstein for many of his discoveries, he "very rarely thought in words at all... his particular ability did not lie in mathematical calculations either but in 'visualizing'... effects, consequences, and possibilities." Friedrich Kekule and his writhing snake which became the molecular structure for benzene were aroused from "kinetic visual images". Not only were images important for spatial configuration thinkers but they were also important for those in literary fields as well. This is further illustrated with people like Samuel Taylor Coleridge who wrote Kubla Khan after it had arisen involuntarily while he was dozing, "all of the images rose up before him as things." Author Joan Didion, uses pictures in her mind as the vehicle to create her novels. The foregoing is a small sample of the great many people who have reported using imagery. This, says Shepard,

does not of course establish that mental imagery actually played the functional role that the various scientists and authors attributed to them. These reports nevertheless suggest that, until we possess a much more complete and satisfactory theory of the creative process, we run the risk of missing something of potential importance if we take it for granted that visual imagery is of no significance.

Shepard has developed a conceptual model of mental imagery through the hypothetical performance of a 'Gedanken' type experiment
in which he tries to elucidate the process.

His hypothetical model utilizes a device which is able to detect the pattern of cortical activity in the brain while one subject is viewing a physical stimulus. This imaginary device is able to reconstruct the brain wave patterns to reform the physical stimulus accurately and thus to transmit this image to subject two. Shepard contends that an analogous relationship between the external stimulus and the resulting inner pattern of neural activity is needed to decode these data. Further, the image produced from an absent physical stimulus should also produce the same response as if it were present. Data from experiments carried out by Shepard, Kilpatrick and Cunningham, support this theory in that the results were indistinguishable between groups who based their judgments on identifiable physical properties of the stimulus when it was and was not present. The subjects performed similar mental processes in perceptual and imaginal conditions and these processes operated on properties of the relevant stimulus either present or imaginal. Shepard further supports his theory with the paradigm of reaction time to corresponding external test stimulus. Test results indicated that much of the same neural circuitry must be used for perceptions and mental images, and through studies of reaction time the intermediate states of the internal process were shown to have a one-to-one correspondence to the orientation of the external object. Shepard believes that future research can be based on this analogue process of
images and their external stimuli.

These type of data are what Yuille asserts as being heuristic and not suitable for empirical analysis since they are based on human observation and verbal response tests, allowing for inferential judgment by the subjects. As the neurobiological function represented in Shepard's model has yet to be proven empirically, the area remains a battleground of debate.

Bugelski attempts to bridge this dilemma by presenting a model which states that learning is a corresponding function of imagery. Bugelski first addresses the historical difficulties in the research and definition of learning. Much like imagery, it has an internal process that can be measured only by behavioral products and inferential characteristics. The assumptions that two stimuli presented almost simultaneously will stimulate neural units and secondly, that when two different neural actions are occurring, some cross pollination occurs between the neural units, such that a future stimulation of one neural unit could activate the second neural unit, are the premises for his model. These are two strong assumptions that Bugelski leans on to develop his notion that an image is a product of neural activity and is therefore directly related to the processes of learning. The response of the brain to a stimulus, he claims, is a conditioned response and that "all conditioning amounts to the formation of associations between neural reactions." A conditioned response is typically identified with the Pavlovian dog experiments.
The conditioning of the dog generated a neural response when the dog heard a bell. This neural response corresponds to a sensory association with food at an operant level.

Bugelski's theory received sharp criticism from fellow psychologists when presented for open commentary. Some of these criticisms point to the weaknesses in his model. Haber asserts that there is not a single stimulus which produces a single response as suggested by Bugelski, but rather a response is produced "through some associated neural event". Haber believes that learning is not only context bound but also that things of interest and importance are "acquired without effort and without intention." So that learning is not a rigid whole but an eclectic grouping of knowledge, language and concepts that are undergoing a constant state of change due to the nature of the sensory being. Haber further asserts that Bugelski does not differentiate between the learning of an image and the properties of an image.

Klinger believes that images do respond to the laws of conditioning suggested by Bugelski, but finds equating imagery to a neural response too confining as it isolates it within a single neural action. He also finds Bugelski's theory too monolithic as it relates to the whole of the conditioned response. This could infer that the image forms at a conscious level due to the action of the neural response. Klinger and Bugelski believe that images are only epiphenomena which can only be verbally reported by subjects.
Research psychologists continue to debate the content of imagery, how it is learned (in whatever, as yet, undefinable process) and its functional role in thought. Others such as Gordon argue that everyone experiences images whether they can be explained scientifically or not. Images exist like unexplained cosmic phenomena. The researcher suggests that the present inability of physical science to explain them is not reason to doubt their existence.

Psychotherapists such as Wolpe and Ahsen were some of the first to utilize imagery in a therapeutic form, and they argue that "Psychotherapy is communication about ideas and feelings aimed toward modification of maladaptive patterns." The form of communication can be lexical, imagined or enactive. Image formation for psychotherapists is the key to an expressive means of communication, rich in emotion and free flowing thoughts. The role of imagery is currently used extensively to treat the reduction of stress, decondition phobias and to control autonomic and affective states. Psychotherapists like the artists referred to earlier, recognize the scientist's need for neurobiologic and psychologic explanations of how and why images appear but focus their energies on the interpretation, coherence and diversity associated with imagery study.

Psychotherapists, such as Horowitz, rely on the definition of an image as "Any thought representation that has a sensory quality." Using subject descriptions, they describe images as having
contents, vividness, clarity, color, shading, shapes, movement, foreground and background characteristics and other spatial relationships. Furthermore, a person can often tell how the image entered his awareness, its duration, associated emotions, the relationship of the image to objects in the external world, efforts to change or dispel it and sequential or simultaneous arrangement of a series of images.\textsuperscript{38}

These are all characteristics represented in the anecdotal reporting of many scientists, artists, writers, musicians and educators, recollections of the role imagery played in their contributions. Even though these characteristics cannot be proven empirically, it is very important to recognize imagery's existence and its significance in the creative thought processes.

Arnheim has long been a proponent of imagery and visual thinking. He asserts that thinking can deal with objects and events only if they are made available within the mind, otherwise they are presented directly through perception. He calls these "memory images"\textsuperscript{39} and they are able to take objects out of context and show them in isolation. These images can also be incomplete as they are the product of a "discerning mind."\textsuperscript{40} Mental images are selective, discarding that which is irrelevant. This became evident for example, in the artistic work of the Impressionists, whose work portrayed images structured in a particular way. Gordon states "the artist cannot escape the burden and the privilege to imagine, to recollect and to feel in forms."\textsuperscript{41} The artist represents through a specific medium what is in his mind, albeit only a replica, it can never
accurately duplicate what the artist has in his mind. This is due in part to the artist's skill development and to the audience viewing the art, as Gombrich states "a medium grown up through tradition and skill--that of the artist and that of the beholder."

Images can also be represented by abstract concepts as presented in Arnheim's studies. Such terms as freedom, pride and hatred evoke images at a more abstract level of thought than those of concrete images such as apple, tree or shoe. A concrete image may be more vivid and clear than abstract images. Arnheim gives the following example, "the solution of theoretical problems more often than not requires highly abstract configurations, represented by topological and often geometrical figures in mental space." Arnheim believes that as the mind operates at high levels of abstraction so too will the images that it creates, and that much of this abstract form of thought can occur below the level of consciousness. This belief is echoed in Shepard's statement that images can be surface structure or deep structure. He believes that surface structure images are those that can be perceived and recognized within one's experiential knowledge and that deep structure cannot be easily identified with either a perceived object or picture, it is more an awareness in one's mind. Arnheim further asserts that "thinking calls for images, and images contain thought." He believes that language and its associated functions with thought are overrated and argues that they produce a linear, static form of thought which produces an
intellectual concept, whereas, an image is a spatial shape appearing as a whole. Thus for Arnheim, images are the key for thought at all levels of the thought process.

Arnheim further believes that the image can function as a picture, a sign or a symbol. These are not types of images, but the function that the image performs. An image is a picture to the extent that it can portray things located at a lower level of abstractness than itself. It is not an exact replica but a production of relevant qualities of the stimulus. An image is a sign to the extent that it replaces a particular content without reflecting its characteristic visually. These signs work as references to the things they stand for, as is the case of the triangle road sign which represents danger without specifying what type of danger or looking dangerous. An image is a symbol when it represents a stimulus higher in abstraction than itself. Artistic works can portray symbols such as good and bad within the same piece of art. Arnheim gives the following example where the visual symbol represents an aural experience, "Musical notation operates partly by means of symbols; that is, it represents the pitch level of sounds by the structurally analogous location of the notes on the staff." In this situation the visual symbol represents an aural experience. A realistic image requires cognition but does not always guide understanding; a symbolic image can bring to life an idea and can aid in varying degrees the thought process. Tomasuto affirms that "the elements that compose a mental image are
derived from the process of conceptual development." which are constantly seeking avenues through which this process can continue. Images can, it seems, be made at any level of concreteness and abstractness of thought.

The art education practitioner, much like the researcher, recognizes the dissonance in defining and scripturalizing the role and function of imagery, but like the artist, seeks to utilize the components of imagery to aid and enhance the learning process. There are a variety of imagery methods that may be used to allow students to isolate themselves mentally and to use their conceptual abilities to imagine. The notion of using imagery to promote one's mental, physical, social, emotional and spiritual well being have been given a great variety of names. Some of these are: directed fantasies, visualization, systematic desensitization, mind play, brain games, meditation, outcome psychodrama, mental practice, mind games, forced fantasies and guided imagery. It is this latter term, "guided imagery", that the researcher uses. Originally, imagery use in psychotherapy was in a free association format. Freud and Jung examined their patients' images by means of asking a person in a relaxed state, to report "every thought regardless of its implications, apparent relevance, logic or propriety". The therapist then breaks this report into phrases which are reported back to the patient and the patient then reports on the associations. This process continues until each component had been presented and
associations made. By 1955, therapists were being encouraged to move from free association of imagery to the application of scenarios. These scenarios are stories or situations which either projects the subject into the story directly or indirectly and are developed so that the therapists could analyze patient reaction to them. In 1965, Desoille developed the "Guided Affective Imagery" technique referred to as GAI. In the GAI, the patient is initiated into a relaxed state using Jacobson's "progressive relaxation" method (a process whereby subjects are systematically relaxing and tensing muscle groups to induce relaxation). This establishes a relaxed readiness that even Bugelski notes is one of the two major conditions prerequisite for high imagery development. Embodied within this state of relaxation was the freedom from distraction. The therapist then leads the subjects through a guided imagery scenario.

The second requisite noted by Bugelski, is the time required for the regeneration of images. Bugelski believes that good imagery associations can be made in "5-8 seconds", however, as the test for paired associate learning was for two images, considerably longer time is necessary in the pausing during a scenario presentation as much more complicated and abstract images are not only being presented but are being formed by the subject.

Most therapeutic scenarios are designed to correct a problem or to overcome a phobia. Scenarios designed to develop imagery skills are few in number. Those that have been written are designed to
practice and improve imagery skills where the subjects visualize a scene. In some scenarios the subject controls the events within the scene but is not a participant. In other scenes the subject becomes a participant within the scene. The scenarios are enhanced by the inclusion of sensory perceptions which help to trigger emotional responses and physical involvement. Inwardly, the subject is very actively involved in either type of scenario but outwardly appears to be dreaming.

A guided imagery exercise is not daydreaming, with all the negative connotations that daydreaming has been associated and often dismissed as a waste of time and energy, but is rather as Singer indicates, a productive force in the learning process. The use of guided imagery states Singer "allows humans to master the environment in ways that no other living being can....We can entertain ourselves, educate ourselves, and enrich our lives in a number of ways without the use of any materials except our minds." An educator can bring into the classroom a great variety of sensory experiences from far away places and engage the students in activities restricted in the classroom situation. In education, the guided imagery exercise is led by a teacher who directs the process by describing a scenario to the students. Richardson encourages the teacher not to read the scenario but to describe it so as to inflect the correct meaning that may be lost due to reading. The students are encouraged to use the memory of all their senses and to image as clearly as possible. The
scenario developed could have specific or multiple objectives as determined by the educator.

These objectives could deal with a variety of functions in education. The first, called readiness imagery by Richardson, is in the cognitive realm where imagery can "prepare students to learn material, aid in the learning or reinforce the cognitive information and concepts." Readiness imagery is the development of mood or tone for a specific activity. For example, in social studies, the fragility of the Pilgrim ship, Santa Maria, can be developed through a scenario which describes the size, structure and capacity to carry provisions. This understanding would benefit the students in a discussion of the problems faced by the crew as they sailed to America.

As a learning aid, paired associate imagery, mnemonics and word list recall studies by researchers such as Paivio and Bugelski, indicate that "words and associations are learned more quickly if they arouse much imagery." Bugelski also finds that there is "much more effective learning for imagers than for verbalizers....Imagery as a mediation to learning has been successful especially when S (subjects) provide their own mediators."55

As earlier quoted, imagery can also function as a cognitive reinforcement, to review and repeat information for the short and long term memory. Imagery could make this process a more creative and exciting one than the use of rote memorization, written review or verbal repetition.
The option is then available for the educator to direct students toward a specific goal in guided imagery or as I shall go on to argue below, to allow for student spontaneity for creative thought production.

Directing students to a specific goal is most evident in physical education. It has both a cognitive and motor learning component which can be acquired through the previously stated method of imagery and through a process identified as psychomotor rehearsal. Psychomotor rehearsal is the process of mentally practicing a physical skill. Coaches, athletic directors and instructors have used this technique to perfect and refine a great variety of motor skills. This form of rehearsal has aided skaters, skiers, basketball players, football players, gymnasts, jumpers, dancers, racquetball players and many others. Through an analysis of thirty studies, Richardson concludes that mental practice procedures of "seeing" and "feeling" oneself in a mental practice procedure does improve performance on that task. Further neurobiologic studies support these conclusions from Richardson. Davidson and Schwartz report "predictable shifts in EEG asymmetry have been found to accompany both overt behavioral tasks as well as covert tasks requiring the self generation of imagery in specific cognitive modes." These tests were for physical and cognitive activities, possibly lending support to Shepard's hypothetical model. Psychomotor rehearsal then involves the use of visual kinesthetics in seeing oneself perform a specific skill and a
physiological image of sensing the bodily feeling of performing that specified skill.

Guided Imagery and Creativity

Many different disciplines have investigated creativity: philosophers, psychologists, scientists, artists, writers, engineers, and businessmen. All of these areas contribute different information which reflect the differing concerns each holds. There are many approaches to the analysis of the complex concept of creativity. Hallman states that creativity is a single event that is a wholly integrated movement and at the same time is a multifaceted event which "includes psychological, environmental, cultural, physical and intellectual aspects." He develops a conceptual system on the data gleaned from a large body of evidence contributed in part by: Guilford, Fromm, Maslow, Wallas, Ghieslin, Freud, Spearman and McKellar. Hallman categorizes these data in five major areas of analyses. These are: personality traits, chronological states, vertical layers of psychological systems, types of thinking and personal reports from creative individuals. From these categories he has developed a conceptual system whereby the creative act can be analyzed into five major components:

(1) it is a whole act, a unitary instance of behavior;
(2) it terminates in the production of objects or of
forms of living which are distinctive; (3) it evolves out of certain mental processes; (4) it co-varies with specific personality transformations; and (5) it occurs within a particular kind of environment. These may be expressed in abbreviated form as the act, the object, the process, the person, and the environment.\textsuperscript{61}

The "act" is the process of combining elements into new relationships and to transpose this relationship onto an unrelated set of materials or conditions. The "product" is characterized by its originality. Hallman expands the definition of originality to include: "novelty, unpredic tability, uniqueness and surprise...from the frames of reference of philosophy, science, art, and psychology respectively."\textsuperscript{62} These characteristics help to define the product of creativity which may be a real, tangible product or the expression of a style of living, as Maslow and others believe. The third criterion, the "process", is the linking key with imagery. Most researchers agree that there is a mental process which is responsible for the act of creativity. There are three dominant schemes within the third criterion, that identify the creative process.

The first, proposed by Wallas\textsuperscript{63} in 1926, classifies it as a four stage process of preparation, incubation, illumination, and verification. The second composite schema presents the point of view that there is a flow of energy between the various levels of psyche from the conscious, rational level to the unconscious, abstract level and that each level contributes to the creative process. (The writers who propose this previous theory and the one following are noted above
and in greater detail in Hallman's article. The third composite schema presents the creative process as a series of mental operations. The creative act combines forms of thought to create new relationships. These schemes are noted as references for the connections with imagery discussed below.

The fourth component proposed by Hallman, is the "person". This is characterized by the individual's motivation and growth in personality changes. Personality dynamics account for the uniqueness in product and experience qualities.

Finally the last component, the "environment", refers to both the internal and external conditions requisite for the creative act, these include both the personal and social characteristics which aid an individual's creative process. Personality traits such as sensitivity, spontaneity, tolerance for ambiguity and self acceptance are identified as conditions learned through environmental factors and not inherited. Support for this theory comes from the many researchers quoted by Hallman.

This summary of theories and definitions of the creative process is presented in order to provide a framework for discussion of the interplay of imagery and learning within the creative act.

Wallas' stage of incubation is a period of germination which he says may last between a few hours and years. During this stage the mind is not at rest but is using imagery as one of the primary processes to discover new relations between the data presented in the
preparation stage. Imagery is the key to the creation of something new. Sometimes this discovery is marked by a sudden spark of illumination in the form of an image presented to the conscious mind. Imagery used in this sense is often referred to as imagination imagery. It is characterized by its brief duration (lasting from less than a second to a few minutes), rapid change in shape and size, vividness, clarity of detail, substantial, and autonomous. It is this free flow of movement and association which can bring about the nonrational in the sense suggested by Shepard above. Imagination imagery can lie below the surface of consciousness and can defy analysis or logic. The notion of the creative process as being nonrational, in the sense of it being a voluntary, tacitly operating process, is the linking thread between the three process-schemes presented by Hallman.

The second schema of the creative process was identified as the energy flow between various levels of the psyche. This theory, as assembled by Hallman, accepts the difference between the conscious and unconscious, surface and deep structure, and autistic and realistic thinking. It asserts that the shift in energy must be from the unconscious to the conscious. This theory parallels Arnheim's belief that images can be formed at the abstract, below conscious level but must be transformed into consciousness in the form of a concrete image. This system also is integral to Wallas' theory, in that the preparation and verification stages must occur at the conscious level.
and the middle two stages occur below conscious level, with the flow of energy being the catalyst in the creative act. The implication is that the "rational" provides the testing ground and the "nonrational" the power for creativity.

The third schema of mental processes or mental operations as supported by Hallman, is a higher level thinking process. The creative act is the combining of forms of thought into new relationships in the nonrational state. Hallman states that "fantasy dominated forms of thought which contain clues to the mind's creative capacities", may be the avenue that future study will follow in order to clarify the creative process.

The term creativity often creates confusion because at one time it may refer to a variety of stages of the process outlined above; at another it may refer to the potential an individual has for such achievements; or it may apply to the process by which the individual's behaviour is directed; and finally it can refer to the product itself. The researcher is concerned with creativity as it refers to the final product, which in this study is assessed by criteria developed by a team of judges as explained in Chapter Three. The process and potential of creativity will be discussed in the conclusion with respect to guided imagery and psychomotor rehearsal.
CHAPTER THREE

A Study of Psychomotor Rehearsal on Student's Ceramic Art Forms

Introduction

There are many possible models that could be used in a research study. Guba states that the two "most widely used" for the purposes of inquiry are the scientific and naturalistic models. Both paradigms have features which are worthy to note.

The scientific inquiry includes the methods and principles of science which are attained through a systemized study or practice. This scientific method includes the generation of a problem, data collection through observation and/or experiment, formulation and testing of the hypothesis, transformation of the data into numerical indices and the formulation of generalizations. The scientific model is formal, using empirical statements referenced with quantitative relationships. The language used is literal and conclusions must be valid.

The naturalistic inquiry is quite different from the scientific model. Guba suggests that there are certain characteristics or "postures" which are associated with the naturalistic model. These qualities are: qualitative techniques, relevance criterion, propositional and tacit knowledge types used, expansionist stance, and a discovery purpose. The methodological characteristics are more
emergent in design, the inquirer is generally the instrument, patterns are analytic units and there is invited interference for contextual elements. The language is more figural and there is not a set procedure to measure reliability.

Eisner refers to a naturalistic paradigm as an artistic inquiry, both carrying analogous qualities: not having a single, simple definition; an idiosyncratic use of form to convey meaning; validity determined by one's view of credibility; focus less on behaviour and more on experience and meaning that is created; and the use of inference and empathy to observe the nonobservable. Eisner asserts that "Neither the concept of science nor the concept of art are settled issues among those who have thought about them most deeply." 

The paradigm chosen for this study is both the naturalistic and scientific model combined. The researcher found it necessary to bridge the two paradigms since the subject of inquiry concerns the controversial issues of imagery, creativity and learning as discussed in Chapter Two.

The melding of the two models is evidenced in the evaluation used in the study. The evaluation of the ceramic pots and the level of creativity, were first formulated through a criterion of experience and inference, then numerically coded to provide empirical data to be treated statistically. The researcher has selected features from both models of inquiry that suited the characteristics and methodology of this study.
Method

The design of the study involves a comparison of effects of student psychomotor rehearsal on skill development and creativity by means of guided imagery in ceramics. The experimental group designated as A, received guided imagery and psychomotor rehearsal before any empirical data were gathered and before any tasks were set. The control group designated as B, received neither psychomotor rehearsal nor guided imagery.

The experimental variables for the purpose of data analysis are psychomotor rehearsal for skill development and guided imagery for creativity. Both groups were set a task without skill training at first. The difference being the use of psychomotor rehearsal and guided imagery with the experimental group. The experimental group received instruction and scenario involvement for psychomotor rehearsal for both tests. The control group received instructions for each lesson with no psychomotor rehearsal or guided imagery.

Since creativity, per se, is not a specific issue, it is not thought necessary at this stage to establish a base line by means of which the performance of each group can be assessed. The purpose of the experiment is to ascertain the effect of psychomotor rehearsal and guided imagery, using assessments of skill and creativity as a measuring device. The fifteen years experience of the writer as an art teacher provided a means of establishing that the two groups of students chosen as A and B were typical, normal classes such as one
finds in hundreds of schools. There was certainly nothing in their background to distinguish one from the other in terms of creativity or skills in ceramics. It would be assumed, therefore, that if the experimental group were judged to perform more competently than the control group, then this would be due to psychomotor rehearsal and guided imagery in both the before-skills and after-skills training tasks.

The subjects are unstreamed and contain a typical urban mix, with a similar wide-spread of ability. There are 179 students in total, 89 students in group A and 90 students in group B. The age range of the students is ten to thirteen. It has been found that there is not a significant development in certain types of imaging ability concerned with visual imagining of sounds over the age of ten. Moreover, it has been found that students in this age range strive for realism in their artistic skill development and are receptive to instruction to attain this end. It has also speculated that the structures or meaning that students develop at this age range offer a mix of fantasy and romantic imagery.

The selection of ceramics as the choice of medium to evaluate student skill development and creativity is made for three reasons. Firstly, clay is a manipulative material and it allows for a more physical demonstration of the student's psychomotor skill rehearsal and representation of their imagery in a creative form. Secondly, ceramics is an art form not commonly taught in the elementary school
setting, attributed mainly to the lack of teacher knowledge and preparedness and so most of the students have very little skill or knowledge, thus presenting a naive student body to work with. Finally, ceramics precludes the possibilities of any developmental hang-ups that students of this age range have about their drawings and paintings. Many students have not modelled clay or plasticene since primary grades and have not developed a level of performance for themselves, whereas, in painting and drawing such standards have been established.

The scenarios for all the lessons are first written and then read from the text. The researcher is very familiar with each scenario and is able to inflect the necessary meaning to use the scenarios to their fullest potential. The time pauses during the scenario range from ten to thirty seconds, depending on the request of the text.

The clay lessons are set within a sequential two week interval of instruction. The lesson time during the day varies according to each class's specific timetable.

The instructions for the before-skills training test, the making of the clay pinch pot and the after-skills training test, the making of an imaginary animal in clay using the pinch pot method, are the same for both groups. All lessons are instructed by the researcher to reduce the variables of instructional style and content.

As indicated, there are 179 students in the experimental study which are divided into seven class sections. The sections are
determined by predesignated classes and class sizes which presented
the researcher with 90 students for group A and 89 students for group
B. The study requires three, one hour lessons for each of the
sections in groups A and B. The following summary outlines the
content of each of the three lessons given to the control and
experimental groups and the order in which psychomotor rehearsal
and/or guided imagery is presented in each of the lessons for the
experimental group.

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson 1</strong></td>
<td>a) Instructions: how to make a pinch pot.</td>
<td>a) Instructions: how to make a pinch pot.</td>
</tr>
<tr>
<td></td>
<td>b) No guided imagery.</td>
<td>b) Psychomotor rehearsal scenario given to practice pinch pot formation.</td>
</tr>
<tr>
<td></td>
<td>c) No psychomotor rehearsal.</td>
<td>c) No guided imagery.</td>
</tr>
<tr>
<td></td>
<td>d) Before-skills training test -- each student makes a pinch pot.</td>
<td>d) Before-skills training test -- each student makes a pinch pot.</td>
</tr>
<tr>
<td><strong>Lesson 2</strong></td>
<td>a) Instructions: how to attach appendages and how to form a hollow ball from two pinch pots.</td>
<td>a) Instructions: how to attach appendages and how to form a hollow ball from two pinch pots.</td>
</tr>
<tr>
<td></td>
<td>b) No psychomotor rehearsal.</td>
<td>b) No psychomotor rehearsal.</td>
</tr>
<tr>
<td></td>
<td>c) No guided imagery.</td>
<td>c) Guided imagery scenario.</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>Control Group</td>
<td>Experimental Group</td>
</tr>
<tr>
<td>----------</td>
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<td>---------------------</td>
</tr>
<tr>
<td><strong>a)</strong> Instructions: form a pinch pot ball tri-animal.</td>
<td></td>
<td>a) Guided imagery scenario -- The Zoo. Pinch pot ball.</td>
</tr>
<tr>
<td><strong>b)</strong> No psychomotor rehearsal.</td>
<td></td>
<td>b) At the conclusion of the guided imagery, students were immediately lead into psychomotor rehearsal of pinch pot skills.</td>
</tr>
<tr>
<td><strong>c)</strong> No guided imagery.</td>
<td></td>
<td>c) Instructions: form a pinch pot tri-animal.</td>
</tr>
<tr>
<td><strong>d)</strong> After-skills training test - each student makes a tri-animal.</td>
<td></td>
<td>d) After-skills training test - each student makes a tri-animal.</td>
</tr>
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</table>

Lesson one instructs both the control and experimental groups in pinch pot formation. The experimental group received psychomotor rehearsal before the before-skills training test and the control group has no such experience during this lesson prior to the before-skills training test.

Lesson two is used to instruct both the control and experimental groups on the skills requisite to attach appendages to the clay pots in lesson three and how to attach two clay pots to create a hollow ball. The experimental group also received a guided imagery scenario at the conclusion of the work period. The control group did not receive any psychomotor rehearsal or guided imagery instruction.

Lesson three is different for each of the groups. The control
group received instructions as to the formation of a pinch pot tri-animal and then performed the after-skills training test with no guided imagery or psychomotor rehearsal. The experimental group received a guided imagery scenario followed by psychomotor rehearsal for pinch pot formation. Then instructions for the tri-animal were presented and the students participated in the after-skills training test.

After the completion of the ceramic lessons, all pieces of work are kiln-fired to reduce breakage. An independent team of three art teachers/professors, evaluate the products for skill development and creativity. Elaboration of this process will be found in the next section.

Instrument Development

Lesson Plans

The purpose of using a before-skills training test is to see whether psychomotor rehearsal induces a higher level of performance than no use of psychomotor rehearsal on an unpracticed skill. The purpose of using an after-skills training test is to see whether psychomotor rehearsal induces a higher level of performance, as judged by the panel of experts, than no use of psychomotor rehearsal on a practiced skill. For consistency, directions are formally read to all students before demonstration of the technique. This ensures that all
students receive the same information and directions. Any questions from subjects are answered at this point only.

As outlined in the above summary, students in the control group did not receive psychomotor rehearsal or guided imagery scenarios in any of the three lessons presented. This summary also indicates that the students in the experimental group received psychomotor rehearsal in lesson one, guided imagery in lesson two, and both psychomotor rehearsal and guided imagery in lesson three. The psychomotor rehearsal was presented before the skills training tests in both lessons one and three. The guided imagery scenarios are presented at the end of lesson two and at the beginning of lesson three to induce a more competent level of creativity.

During the construction phase of lessons one and three the researcher becomes a silent observer.

At the conclusion of each lesson, products are put away to dry safely.

Scenario Development

The scenarios are written with three objectives in mind. The first objective is the psychomotor rehearsal of the steps involved in making a pinch pot. The second objective is to re-acquaint the students to imagery or daydreaming as they like to call it. Most students do not experience this form of instruction in school and are surprised at its inclusion within the lesson. The third objective is to provide opportunity for the students to practice imagery and
encourage the fostering of creative ideas. Each exercise includes a variety of sensory modes, with the emphasis on the visual and kinesthetic.

The scenarios are fashioned after deMille's model, incorporating the coming back to reality reference point by naming the exercise just played as a game. This serves both to signal an end to the game and to remind the students that the "rules of reality are in effect again". As shown in the following scenarios, each slash mark between statements indicates a pause of between ten and thirty seconds, determined by the notion of the statement. All students are brought into a relaxed state with conducive room conditions.

**Scenario lesson one.** This game is called Clay Ball./ Pick up your piece of clay./ Feel how cool and moist it is./ Smell the earthy, damp quality of the clay./ Slowly pat and roll your piece of clay into a circular ball./ Hold the ball of clay in your non working hand, for example if you are right handed put the clay in the palm of your left hand./ Place the thumb from the other hand into the middle of the ball./ Feel the coolness of the clay as your thumb sinks to the middle of the clay ball./ Slowly start to push your thumb against the fingers holding the clay ball./ See the hole become larger./ You are pushing out the walls of the pot./ Turn the ball slowly in your hand as you push out the walls./ Feel the walls for evenness as you form them against your other hand./ Look to see that the walls are not becoming too thin and floppy./ Feel the inside bottom of the pot for evenness
of wall thickness here too./ Turn your pot in your hand./ Look closely./ Is it round?/ Is it even all the way around?/ Are the sides the same thickness?/ You have made a pinch pot./ Open your eyes/ What is the name of the game just played?/

Scenario lesson two. This game is called Changes./ Let us imagine that you are sitting in a spot on a field./ It is summer and the sun is warm upon your face and arms./ Next to you is a small green bush./ You roll over onto your tummy to get a better look at it./ You notice the leaves first./ Are the edges smooth or rough?/ Is the leaf shiny or dull?/ You reach out and touch a leaf./ Is it smooth or prickly?/ You notice the branch that the leaf is attached to./ The branch has textures./ As your eye wanders along the branch it notices a small, green curled up thing./ You peer closer and notice it has scales./ You gently reach up and poke it./ Slowly it starts to unwind./ It is a caterpillar./ It crawls across the branch to a leaf./ It eats the leaf like a salad with loud crunching noises./ The caterpillar grows fatter./ Fatter./ Even fatter./ Suddenly it hangs upside down from the branch./ Its scales disappear./ Its green colour changes into a pastel yellow./ Now white./ All is still./ The caterpillar is encased in a white shroud./ It is very delicate to touch./ Suddenly you hear a loud cracking noise./ You jump back startled./ Where did this noise come from?/ You peer more closely at the bush./ You notice a hole forming on the
shroud. It gets larger. A wide crack. A long slender antenna reaches out. Now two. Slowly followed by a long wet bug. Within seconds the warm sun dries it. A butterfly. It stretches its wings in the summer sun. You notice its vibrant colours. You examine its intricate patterns. You sneeze. The butterfly is gone. Was it ever there or was it your imagination? You roll over and sit up. Time to go home. The name of this game has been?

Scenario lesson three. This game is called zoo.

Let us imagine that we have a zoo. Make it a big zoo with lots of cages. There are a lot of people at the zoo looking at the cages. Hear the noise and excitement of the people. Smell the popcorn and animal smells as you walk around. Look at the cages. You be one of the people looking at the cages. Stop and look at one cage. Feel the cold strength of the iron bars. What animal are you looking at? Let us change this animal into a clay animal. Let us give it a colourful fur. Change the colour of the fur. Change it again. Change it to the colour that you like. Change the animal's legs. Let us make the legs longer. Now make them even longer. Have the legs shrink to a length you like. Let us change the animal's face. Again make the face change. Let us change the animal's ears. Again. Now change the animal's fur to feathers. Change the colour of the feathers. Have your animal grow wings. Let your animal fly around. Bring him back to the cage. Change the feathers to scales. Keep the wings if you
like./ Change his legs into flippers or fins./ Change your animal's head./ Now have your animal dive into the ocean./ Let us have your animal crawl up on shore./ Change its scales to skin./ Add a tail or legs if you like./ What colour is it?/ Change the colour./ Change it again./ Now change it to your favourite colour./ Let us now change the animal and make it two animals in one./ Are you satisfied with the combination?/ Try another combination./ Another one./ Let us now add a third animal part to your animal duo./ Change that part./ Change the part again./ Let us look at your animal from the front./ Walk around the animal and have a side view./ Now walk around the animal for a rare back view./ This is your special tri-animal, keep his image in your mind./ Now roll your animal into a ball of clay./ Divide the ball into two smaller pieces./ Choose one ball./ (at this point, the scenario from lesson one is repeated except for the end statements) Put this pot aside./ Pick up your second ball of clay./ Make another pinch pot following these same steps. Now score the top lip of each pot./ Add some slippery, slimy slip to the rim./ Put the two pots together to make a hollow ball./ Squeeze carefully so as not to squash the ball./ Now add the features that made your tri-animal. (long pause) What was the name of the game just played?/

Evaluation Criteria

The evaluation team is comprised of three people who are considered expert in the field of student ceramic art work. Two are
university professors in art education and one is an art educator, currently working in an elementary school. The evaluation criteria for the before-skills training pot and after-skills training tri-animal are chosen from pinch pot standards discussed by the evaluation team. The chosen standards are: a quality pinch pot is round in shape, symmetrical, with even wall thickness and a base commensurate with its spherical shape. These criteria are given a numerical rating. The scores are as follows.

<table>
<thead>
<tr>
<th>Numerical Score</th>
<th>Rating</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Excellent</td>
<td>exhibits all of the above</td>
</tr>
<tr>
<td>4</td>
<td>Superior</td>
<td>exhibits most of the above</td>
</tr>
<tr>
<td>3</td>
<td>Fair</td>
<td>exhibits some of the above</td>
</tr>
<tr>
<td>2</td>
<td>Inferior</td>
<td>exhibits few of the above</td>
</tr>
<tr>
<td>1</td>
<td>Poor</td>
<td>exhibits none of the above</td>
</tr>
</tbody>
</table>

Each student's product is evaluated by each judge. Three independent scores are then presented for each piece. The scores are analyzed individually for each judge and cumulatively with all three scores added together. This process occurs for both the before-skills training test pinch pot and the after-skills training test tri-animal. In the evaluation of the tri-animal, skill level in pinch pot formation is evaluated as for the before-skills training test; structural skill and appendages are not evaluated.
The judging team also analyzes the tri-animals for creativity. As previously discussed, the definitions of creativity are varied and many. The researcher and evaluation team chose originality as one of the key characteristics of creativity. Torrance\(^9\) describes originality as the ability to produce ideas that are away from the obvious, commonplace, banal or established. This was augmented by Mednick's\(^{10}\) belief that the creative thinking process forms associations in new combinations that meet specific requirements and the more mutually remote the elements of the new combination, the more creative the process. As the requirement is to produce a tri-animal, an animal composed of three different animals, the level of creativity will be judged on the unusual, bizarre and surprising combinations represented.

A review of these criteria are presented to the judges prior to evaluation. The judges score the tri-animals on the following scale:

<table>
<thead>
<tr>
<th>Numerical Score</th>
<th>Rating</th>
<th>Originality Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Excellent</td>
<td>3 or more associations</td>
</tr>
<tr>
<td>4</td>
<td>Superior</td>
<td>2 - 3 associations</td>
</tr>
<tr>
<td>3</td>
<td>Fair</td>
<td>1 - 2 associations</td>
</tr>
<tr>
<td>2</td>
<td>Inferior</td>
<td>1 idea represented</td>
</tr>
<tr>
<td>1</td>
<td>Poor</td>
<td>no original ideas</td>
</tr>
</tbody>
</table>
These scores are also analyzed independently for each judge and cumulatively.

**Anecdotal Observations**

Observations are made during the lessons and after each scenario presented. The researcher documents comments from the students about the process and skills being used; the imagery process; time lapse for students to become involved with the construction of their tri-animal; and notes about two handicapped students, one who was 90% blind and the other who has multiple sclerosis. A summary and discussion of these observations is given in the next chapter.

**Administration of the Study**

Approval of the study in School District #38, Richmond, British Columbia is given by the Superintendent of Schools. Discussion and benefit to the staff and students are presented to the two principals involved. Both are very receptive and supportive of the study and the researcher.

The study takes place in two Richmond elementary schools during January, February and March, 1986. The researcher instructs all the lessons to the 179 students involved in the study. The classes of students are divided into group A or B, with fairly equal numbers of each age level present in both groups. Sex is not considered a determining factor.
Teachers are asked prior to the study if they are willing to participate and the study is explained in depth at that time. All teachers are enthusiastic toward the study.

A schedule is worked out that suited each teacher's timetable. A master timetable is then distributed to each teacher indicating lesson times and dates for all three lessons. The timetable insures that all students had their lessons following one another with a time lapse no greater than two weeks.

The students are told that their work will be analyzed for a research study and that the quantitative results will not be used for their personal achievement scores on their report cards. To allow for anonymity, students are given a number to code their products. The numbers are 1 - 89 for group A and 90 - 179 for group B.

The lessons are taught in the students' home classroom. Some class teachers remain in the classroom; others do not. The teachers who do remain are observers and do not participate in the lesson.

The introductory lesson includes information about the composition of the clay and its need for moisture; a demonstration of wedging and the formation of the pinch pot; and a review of behavioral expectations of the students. Students are guided in the making of a 'whuzzit' to demonstrate how quickly warm hands dry out clay. (A whuzzit is a small creature pinched into shape from a marble size piece of clay.)

After the final discussion and scenarios in lessons one and three
for group A, and final discussion for group B, all the students verbally review the steps for pinch pot formation. Students are encouraged to ask questions at this point. Once work commences, no further directions or assistance is given by the researcher.

Scenarios are presented to group A students in each lesson. The students are told they will be playing a guided imagery game. All students are encouraged to participate but can choose not to if they are not able to demonstrate good self control during this time. The students are asked to find a comfortable position to sit or lie in the classroom, physically away from other students. Some choose to remain at their desks, others lay on the floor, under tables, while others sit on tables or even heat registers. The lights are dimmed, blinds drawn and doors closed -- with a "do not disturb" sign posted to present an environment as free from external sounds and distractions as possible in an elementary school setting. The scenarios are read by the researcher to all students in group A in this type of setting.

After each lesson, products are checked for numerical coding and left safely to dry. All pieces are bisque fired for easier handling prior to evaluation. The students are also keen to receive a semi-finished product.

For evaluation the pieces are displayed in groups of before-skills training test pots and after-skills training test tri-animals, set up numerically. The judges do not know the number break down for groups A and B, in order to ensure that the evaluation
remains as fair and unbiased as possible. Following the evaluation, the researcher photographed pots from each evaluation category and some of the superior to excellent tri-animals. These photographs are found in Chapter Four.

Following the evaluation, products are returned to the students. The researcher does do two more follow up lessons with each group of students to glaze and fire their pieces for a totally finished product.
CHAPTER FOUR

Results and Analysis

Results

The assessments from each judge are compiled and loaded into a computer program. The software program, "Stats Plus", is utilized to process and analyze the raw data.

A t-test is used to test the difference between two independent sample means, the experimental group A and the control group B. The size of the samples are unequal but this is accommodated in the program. The work of six students is either incomplete or explodes during firing. The researcher chooses the common level of significance at $p < 0.05$. Values for $p$ less than .001 are not shown. It is considered that this probability level is indicative of a degree of certainty that a real difference does exist, that is, that the observed difference is not simply due to variations of sampling.

TABLE 1

Before-Skills Training Test Pinch Pot Skill Development Evaluation Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>88</td>
<td>3.091</td>
<td>.655</td>
<td></td>
<td>(171)</td>
</tr>
<tr>
<td>Judge 1</td>
<td></td>
<td></td>
<td></td>
<td>3.325</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.694</td>
<td>.900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judge 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 1 (Continued)

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>88</td>
<td>3.080</td>
<td>1.020</td>
<td>1.214</td>
<td>.2242</td>
</tr>
<tr>
<td>Judge 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.894</td>
<td>.988</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Group A | 88 | 3.216 | .964  |       |      |
| Judge 3 |    |       |       | 6.689 | <.001 |
| Group B | 85 | 2.271 | .892  |       |      |

| Group A | 88 | 9.705 | 2.441 |       |      |
| Judges 1+2+3 |  | 5.078 | <.001 |       |      |
| Group B | 85 | 7.859 | 2.336 |       |      |

### TABLE 2

**After-Skills Training Test Tri-animal Skill Development Evaluation Results**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>88</td>
<td>3.261</td>
<td>.809</td>
<td>6.617</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Judge 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.529</td>
<td>.749</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Group A | 88 | 3.409 | .879  | 3.298 | <.001 |
| Judge 2 |    |       |       |       |      |
| Group B | 85 | 2.976 | .845  |       |      |

| Group A | 88 | 3.205 | .961  | 4.101 | <.001 |
| Judge 3 |    |       |       |       |      |
| Group B | 85 | 2.612 | .940  |       |      |
Table 2 (Continued)

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>88</td>
<td>10.068</td>
<td>2.303</td>
<td>4.373</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Judges 1+2+3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>8.471</td>
<td>2.500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judges 1+2+3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3

Tri-animal Creativity Evaluation Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>88</td>
<td>3.477</td>
<td>.959</td>
<td>5.782</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Judge 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.706</td>
<td>.784</td>
<td>2.203</td>
<td>.0272</td>
</tr>
<tr>
<td>Judge 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>88</td>
<td>3.000</td>
<td>1.194</td>
<td>2.203</td>
<td>.0272</td>
</tr>
<tr>
<td>Judge 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.624</td>
<td>1.046</td>
<td>2.906</td>
<td>.004</td>
</tr>
<tr>
<td>Judge 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>88</td>
<td>2.864</td>
<td>.912</td>
<td>2.906</td>
<td>.004</td>
</tr>
<tr>
<td>Judge 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>2.459</td>
<td>.920</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judge 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>88</td>
<td>10.352</td>
<td>2.533</td>
<td>7.500</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Judges 1+2+3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>85</td>
<td>7.576</td>
<td>2.327</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judges 1+2+3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The before-skills training test pinch pot skill development results indicate a significant p value for two of the three judges and
for the cumulative scores of all three judges. This means, that in this study, psychomotor rehearsal did make a significant difference on an unpracticed skill. Those students who performed a psychomotor rehearsal on pinch pots produce a higher level of performance on before-skills training test in this study, than those students who have no such experience.

The after-skills training test results of tri-animal skill development indicate a p value of <.001. In this study, the results show a significant difference for those students using psychomotor rehearsal. The students using psychomotor rehearsal produce a higher level of performance on the after-skills training test when compared against those students who do not use psychomotor rehearsal.

One could therefore assume from the results, that in this study, psychomotor rehearsal does make a significant difference on both an unpracticed skill and a practiced skill in terms of higher performance levels, as judged by the panel of experts, compared to those students who did not use psychomotor rehearsal. The researcher therefore feels justified in concluding that psychomotor rehearsal enhances student skill development as defined by the judges in ceramic art forms.

The evaluation of creativity for the tri-animal further supports the hypothesis that guided imagery does enhance the performance level of creativity as defined by the panel of judges in this study. The results for two of the three judges and the cumulative judge scores indicate that a significant difference does exist between the control
and experimental groups who use guided imagery. The results indicate, that in this study, the use of guided imagery does in fact appear to enhance the student's level of creativity. The researcher feels justified in stating that the use of guided imagery does aid in the formation of new associations and ideas as presented in this study.

These data then support the hypothesis that psychomotor rehearsal does improve skill development not only on a practiced skill such as the after-skills training tri-animals but also on an unpracticed skill of the before-skills training pinch pots, as indicated by the results of this study. Likewise, the inclusion of guided imagery in the instructional component of an art lesson appears, from the results of this study, to produce a higher performance level of creativity.

These results from this study lead the researcher to believe that there is a place for guided imagery and psychomotor rehearsal in art lessons. A more thorough experiment could be carried out in the future that would assess with a suitable pretest, the level of skill development and of creativity for both the control and experimental groups. This would produce a base line from which posttest results and development could be assessed. These data would not only indicate the level of development on an unpracticed skill to a practiced skill in the control group but would also establish the difference that psychomotor rehearsal would have on a skill only performed once. In other words, the control and experimental groups would both do a pinch pot pretest with no psychomotor rehearsal for either group. The
students could then produce a second pinch pot, with the experimental group performing psychomotor rehearsal first and the control group building the pot for a second time with no psychomotor rehearsal. The researcher could then compare growth of the students' skills through practice alone and through practice and psychomotor rehearsal combined. Further studies of this nature could also investigate growth after skills training and the use of psychomotor rehearsal, as well as the influence of guided imagery on the levels of creativity as measured by standard test means. Does guided imagery only enhance the performance level of a specific task, such as in this particular study, or does it effect the overall level of creativity of the students as determined by a creativity posttest? These are some possible areas of future research in the areas of guided imagery and psychomotor rehearsal in ceramic skill development.

Anecdotal Report and Summary

The researcher culled through her observation notes to yield the following groups of data, summarized for the purpose of brevity.

1) Students exhibit enthusiastic response to work with the medium of clay. A chorus of 'yeahs, terrific, super' are generated after the researcher's introduction to the students.

2) Students express verbal, sensory awareness to the clay and its properties: 'cool, damp, soft, smooth, slippery,' - tactile; 'musty, earthy, dirt type odour,' - olfactory; wedging action of clay,
eye/hand coordination, finger and tool manipulation, 'this is fun, this is hard work, my fingers ache, my hands won't do what my brain says, I like throwing the clay down hard, I don't feel so frustrated' - physical movement, 'Wow look at this! Hey watch this! I like what you made! How did you do that? How did you get the clay to do that? What do you use for that texture? - visual.

3) Students display a sense of disbelief when told about the guided imagery game. 'We don't have to do anything except use our heads? You mean you want me to make pictures in my head? Can I daydream? How do you know you are doin' it?' Many students have never experienced a guided imagery session and all are enthusiastic to participate. Despite the strong peer pressure to conform at this age range, no problems are experienced in any of the scenario sessions. As a matter of fact, one lad misses his guided imagery session due to a visit with the school nurse, so upon his return to class he asks if he can stay after school to experience it. The researcher gladly complies and he thoroughly enjoys his guided imagery experience.

4) Students all enjoy the guided imagery, 'Ahh, is it over? Can we do more? Will we do this next time? This is neat! Yeah, I like this kind of learning.' During the sessions, many students find it difficult to suppress their awe at such beauty as the butterfly and their laughter as their animal changes into various shapes and sizes; during the kinesthetic rehearsal, several of the students are observed using their fingers and hands as the steps of the scenario are read to
5) After each scenario the researcher inquires as to whether anyone had difficulties in seeing a picture in their mind. After the first guided imagery session, there are only three students who said they had difficulty seeing the caterpillar on the bush, yet they are all able to feel the warm summer sun and be surprised by the crack and hear themselves sneeze. After the guided imagery for lesson number three, none of these students experience difficulty in visualizing the images.

6) The students who do not receive the guided imagery in lesson three take a much greater length of time to get down to work to produce a product. The average length of time is fifteen minutes! With one student who wedges his clay for thirty-seven minutes before he starts to work. These students tend to rely on one another for ideas and frequently change their minds half way through the construction of the tri-animal.

The students in group A all start within three minutes of the scenario ending. The researcher asks each student what combination of animals they are going to put together and there is not one student in group A who changes their mind from their visual image blueprint. This indicates that the students with guided imagery have a mental picture of what they are going to do after exploring the possibilities in their mind. Those students without the guided imagery had difficulties not only in generating types of animals but also in
making various associations to develop a tri-animal.

The only drawback that some of the guided imagery students experience in making their tri-animal was the lack of experience with the medium of clay for making such things as long thin giraffe necks or bird wings that stay out in flight. The researcher did aid by adding paper supports but not by redirecting the clay formation.

7) The student who was almost blind took great interest in his clay work and the guided imagery sessions. He enthusiastically participated in the scenarios, reporting sharp visual images. His blindness is of a congenital nature, so he did have vision as a very young child. He is initially very quiet while he sits shaping his clay into a ball. He works for a long time to perfect its shape. When he does form his pinch pot the first time, he works very rapidly which results in a pot with floppy walls. He collapses this one, wedges the clay and this next time works methodically at making his pot. He forms his ball more quickly this second time but is much more careful as he produces his pinch pot. This student takes the same care in building his tri-animal, delighting in creating textures all over the surface of his animal. "I like the way his tail feels. Can I have some clay to take home? I want to show my mom what I made today." He is very excited and pleased with his product and himself at the end of lesson three. Evaluations of the student's work are "fair" with one judge giving him a superior for posttest skill and creativity.
It is obvious from the beginning that this student enjoys working with a manipulative material. His mental associations and rehearsal help him not only with the skill and ideas for his tri-animal but also in the forming of its parts. He said, "I know how to connect my dinosaur's tail because I saw it crashing about in my mind and saw that it was very fat where it connects to the body. I also could see all the scales all over the dinosaur."

Upon sharing his dialogue with the student's teacher, she is very pleased to hear that he has acknowledged his learning process and his positive affirmation of his work. Apparently he lacks confidence and a positive self concept. The use of the tactile medium and the visual imagery rehearsal both aid in this positive self affirmation and recognition of accomplishment. Perhaps this is an indication that other students, not necessarily of poor vision, could have their self esteem enhanced with more imagery use in the class.

8) The student with multiple sclerosis has a teaching assistant who works with her in all subject areas. The T.A. indicates to the student that she is going to leave and that she try this activity on her own. The student is very slow to start on the pinch pot task. Her hand movements are quite spastic initially and it takes twenty minutes to form a ball. The actual production of the pinch pot is very difficult for this student as she cannot coordinate her hands together. She solves the problem by putting the ball of clay on her desk and supports it with her left hand and works on it with her right
hand. The turning of the bowl is sporadic, producing a poorly formed pot.

During lesson number two, the student appears to have better control of her hands and the clay. She is able to manipulate the clay to form a nose and attach it to a flat piece of clay. The researcher initially assists her with the tools for scoring the clay, however, she soon masters her own method of scoring her clay with a pencil. This is found to be just as satisfactory as the sharp dental tools the other students are using.

The student experiences great difficulty in putting her two pinch pots together. She receives verbal encouragement from her teacher and perseveres with the task, finally forming a mis-shaped hollow ball. The student attaches some appendages and scores her number on its underside. The look of satisfaction on her face as she gives the researcher the tri-animal, expresses a deep sense of accomplishment for herself.

As with the blind student, this student has a low self concept and felt very positive after her work with clay. She sees the researcher arrive at the school and quickly asks when she can have her tri-animal back to take home to show her parents. Working with a manipulative medium for this student is difficult, but she works hard and felt positive about her accomplishments. Unfortunately, this student is in the control group, so she does not get to experience any of the imagery or psychomotor rehearsal scenarios. It would be
interesting to see if mental practice aided M.S. patients in their daily living practices and other motor skills that they must work so hard at learning, an area for future study and research.

9) The students do talk to one another about the imagery scenarios. The control group wanted to know why they are not having these great experiences too. The researcher explains that this was part of the study and that seems to satisfy their questions. Fortunately the control group B students are asked to make their tri-animals before group A, so there is not a discussion of topics prior to their scenario work.

10) The researcher notices a greater involvement and enthusiasm toward the tri-animal work from the students who receive the guided imagery. The students eagerly share with each other what they are going to make. There is no copying or changing of ideas between the students. The students react to one another's visual images as if they all have one and all see various things in their mind's eye. The students never question the validity of imagery in either its guided form or for psychomotor rehearsal. This leads the researcher to believe that this is one of the ways in which children learn without the confines of the classroom.
Before-Skills Training Pinch Pots - Evaluation: Excellent

Figure 1a

Figure 1b
Before-Skills Training Pinch Pots - Evaluation: Superior

Figure 2a

Figure 2b
Before-Skills Training Pinch Pots - Evaluation: Good

Figure 3a

Figure 3b
Before-Skills Training Pinch Pots Evaluation: Inferior

Figure 4a

Figure 4b
Before-Skills Training Pinch Pots - Evaluation: Poor

Figure 5a

Figure 5b
Before-Skills Training Pinch Pots Comparison - Evaluation (1-6)

excellent, superior, good, inferior and poor

Figure 6a

Figure 6b
After-Skills Training Tri-Animals - Creativity Evaluation: Excellent
After-Skills Training Tri-Animals - Creativity Evaluation: Excellent and Superior

Figure 8a

Figure 8b
CHAPTER FIVE

Conclusions

The results of this study would seem to support the experimental hypothesis and the basic assumptions in the general theoretical framework proposed. This framework suggests: that with the inclusion of psychomotor rehearsal, ceramic skill can be developed and refined, and further, that guided imagery possibly gains greater functional significance as a mediator for creativity.

The evaluations of the ceramic skill development and the assessments of creativity in the final product were supplied by a panel of judges who are considered expert in the field of student ceramic art forms. This evaluation panel discussed the established criteria for a pinch pot for both the before-skills training and after-skills training as outlined in Chapter Three. The judges analyzed each ceramic piece with these criteria in mind, referenced with their own experiences and observations of student clay work. These types of data are rated numerically and are generated inferentially. However, the data for skill development are more directly related to observation of the pots than those collected for creativity. In this case, the evaluation team also discussed the criteria outlined in Chapter Three but the frame of reference for each criterion for creativity will be unique to each judge, as they each bring their own experience and perceptions to the evaluation.
Consequently, it is much more difficult to ascertain the salient features of each ceramic art form which brought about its particular creativity score. These scores are, therefore, interpretive, yet analysis of the data indicates similar patterns from all three judges.

The evaluation of students who practiced psychomotor rehearsal during the before-skills training phase of the study seems to suggest a significant development in their skill level as compared with students without such practice. Although one judge's scores do not indicate a significant difference between the two groups, those from the other two judges and the cumulative scores support this finding. Students with little or no previous experience with clay, who perform the psychomotor rehearsal of pinch pot construction, produce a higher-level of performance on clay pinch pot than those students who have no such experience in this study.

The results for the experimental group during the after-skills training phase of the study parallel those of the before-skills training test. Both the individual judge scores and the cumulative judge's score indicate that differences do exist between the control and the experimental groups. Again, those students who perform psychomotor rehearsal of pinch pot formation on a practiced skill produce a higher level of performance on clay pinch pot than those students who have no such experience in this study.

These data support the findings identified in studies reviewed by
Richardson,\textsuperscript{1} that skill development shows significant improvement with psychomotor rehearsal. This also applies to skill development in ceramic pinch pot formation in this study. The inclusion of psychomotor rehearsal in order to practice a specific motor skill seems to make a significant difference in the learning process for students.

The final analysis of the data is an evaluation of the tri-animal creativity. The criteria for scoring the ceramic pieces are based on the judges' notions of originality and the number of unusual combinations presented by the student to meet the specific requirements for the tri-animal. Students who experience the guided imagery technique during the final lesson seem to produce tri-animals that have a significant difference in performance level than those students who had no such experience in this study. Individual and cumulative judge scores indicate this pattern of creativity for the student's tri-animals and lend further support to the findings of Bugelski's\textsuperscript{2} studies which indicate that imagery is an effective mediator for learning. Additionally, Wallas' (Chapter Two) notion that imagery is the key to the creation of something new is also supported by the results of this study. Students who experience guided imagery seem to be able to construct more creative products than those students who have no such experience in this study.

The target group of students used in this study are chosen for their developmental abilities and desires as indicated in Chapter
Three. The study seems to have been effective for this age range in both the use of psychomotor rehearsal for skill development and for guided imagery as a mediator for creativity. However, it may not be as effective for younger children who may not have the conceptual development to mentally rehearse a physical skill. They will be able to participate in guided imagery scenarios, as observed by the researcher in her own classroom of six and seven year olds. Whether or not the guided imagery scenario enhances creativity at this age level is a subject for future study. Similarly, students older than the target age range can benefit from psychomotor rehearsal of skills as supported by Richardson. On the other hand, they may find that the guided imagery scenario inhibits their level of creativity rather than acting as a catalyst. Many artists, as well as students, seem to be limited in their production of art. This is not due to their level of creativity but by their lack of skill development and schemata. Gombrich states that "schemata" are the knowledge and awareness of forms which supports one's memory images. The production of an art form starts with an idea and some standard conventions or rules and it is suggested by Gombrich that creativity starts when the rules are deliberately broken or give way to the new creation. Guided imagery can therefore only lead an individual to a certain point in their production of art works and in their ability to be creative. The rest, it seems, must come from their own subjective inspiration. This poses a question concerning validity and reliability when guided
imagery is used with elementary school age students who are making art forms. Is the art produced by children synonymous conceptually to that produced by artists? If one accepts the premise presented by Gombrich, that an "art" work can only be made when one is familiar with the traditions and assumptions of art, then the answer is no, the work of students does not correspond to the work of established artists. The researcher can only suggest that from her experience with elementary age students that guided imagery is a valid tool in the mediation of creativity and that it also is a reliable form of enhancing student imagery in the forming of new associations. It seems to be both valid and reliable for the art work of students at this age, even though the works produced may not be considered to be true art. This presents an area for further investigation as to the use of guided imagery in the classroom to mediate for creativity at a variety of age ranges, and also to investigate the degree of usefulness of guided imagery for adult artists familiar with the traditions of art work.

Emerging from the observations made of students working during these three lessons are some of the following conclusions about their enthusiasm for clay, verbal sensory awareness, time to start task, consistency versus change in student art forms, lack of skill, and involvement in the final lesson.

Students from the experimental group worked with more demonstrable ease and confidence with the clay than do those students
in the control group. Students from both groups enjoyed the medium of clay not only for its novelty but also for its sensory experiences.

The students in both groups were verbal about the medium and its various characteristics. Students from both groups commented about the tactile qualities of the clay and its odour. Many of the students recognized their use of eye-hand coordination and enjoyed the physical movement necessary to manipulate the clay. Those students who experienced the psychomotor rehearsal scenarios seemed to be more at ease with the medium than those students who have no such experience.

The students in the experimental group worked with a clear sense of purpose and direction as the clay was manipulated into the required shapes. The students in the control group sought help from one another during this stage, demonstrating that this particular skill had not yet become part of their skill repertoire with clay.

The experimental group students remained individualistic with their ideas, combining animal forms that they have visualized during the guided imagery. These students are also quick to start working on their tri-animals. The control group students not only have difficulty in starting to make their tri-animals but also rely on their peers for ideas, changing their minds frequently about the combination as they construct their tri-animal.

Students from both groups experienced some difficulty with the technical aspects of clay sculpture as presented in Chapter Four. These technical skills come with experience and conceptual development
in the work with clay and constitute part of Gombrich's skills in the traditions of art.

All students who experienced both the psychomotor rehearsal and the guided imagery scenarios were enthusiastic toward this type of 'instruction'. The positive attitude exhibited by the students in the experimental group, coupled with the improved quality and creativity of their ceramic art forms seems to indicate the viability of this type of instruction for ceramic work.

Observations of the visually impaired student present some directions for inclusion of psychomotor rehearsal and guided imagery in lesson instruction and further research studies. The introspective reports from the student indicate his reliance on imagery to aid in his construction of his animal. This suggests the possibility that visually impaired students might rely on imagery to assist them in other areas of conceptual development. The use of psychomotor rehearsal could also enhance this development. The image appears clear in their minds when they practice the desired physical skill. This again points to an area of further research using guided imagery and psychomotor rehearsal with visually impaired students. The use of a tactile medium for the visually impaired is also beneficial not only in allowing the student to experience the medium in other sensory modes, particularly the sense of touch -- this student delighted in the textures he could create -- but also in presenting a medium in which he can experience success, thus enhancing his self concept.
The student with multiple sclerosis initially found the clay difficult to work with, however, with practice and persistent patience the student did accomplish the project to her satisfaction. The sense of pride and fulfillment exhibited by this student suggests that clay may not be too difficult a medium for her to work with and that it did allow her to develop her own methods of working with the clay. It would be of interest to see what effects guided imagery and psychomotor rehearsal would have on students handicapped in this manner.

The scenarios written for guided imagery and psychomotor rehearsal differ in their objectives. The objectives for psychomotor rehearsal are to present a sequential process of a physical skill so that the student uses visual kinesthetics to see oneself perform the task and a physiological image to sense the bodily feeling of performing that specified skill. Guided imagery can be used to reawaken imagery in all sensory modes for each individual. As DeMille states,

There seems to be a permanent war going on between reality and imagination. The battleground is childhood. On the side of imagination we have the child, eyes great with wonder, mouth issuing fantasies, misconceptions, and unreliable reports. Parents, teachers, the peer group, and the police are on the side of reality. They keep insisting on truth, accuracy, conformity, and obedience....This is not a war to take sides in, because there is much to be said on either side. The main purpose...is to stop the war, so that reality and imagination can live in harmony.
The reawakening is deemed necessary by DeMille because he believes that in the process of trying to instruct children on the differences between reality and imagination, it appears to be at the expense of imagination. Guided imagery can be used according to DeMille to "render the imaginative faculty enduring". Guided imagery also encourages visualization.

As presented in Chapter Two, there are a variety of sensory modes and types of imagery under current study. Imagery is linked to facets of intellect that seem to bring about significant creative effort in many fields such as painting, sculpture, architecture, and so on. Imagery is accepted as a functional mediator by many researchers who accept the tacit form of knowing that imagery does exist. Taking the stance that imagery does exist and is able to function as a mediator for creativity and learning can be supported by studies completed by Paivio and Hallman.

In his study on paired associate learning and memory, Paivio discovered that students who are able to produce images that are vivid and clear of the associations, have a higher memory ability than those students who produce hazy or indistinct images. The memory function that Paivio is investigating is short term memory and he concludes that students with high imagery abilities have been found to be superior in memory to students with low imaging ability. The ability to image may also be important in reviewing one's long term memory to produce new forms and modified images that have been presented in many
introspective studies mentioned in Chapter Two. An extrapolation of Paivio's study on long term memory and the significance of imagery may produce evidence that suggests that imagery is also a necessary function for long term memory.

This position is supported by Arnheim, as he believes that thought is contingent upon imagery. If this is held to be true, then the use of guided imagery to strengthen one's imagining abilities would also further develop one's thought capacities as well. The divergent, problem solving thinker has a ready tool at his disposal in the form of imagery.

The schemes presented for the process of creativity all indicate that the creative act combines forms of thought to create new relationships. Following Arnheim's theoretical model, one could assume that the necessary key for the functioning of the creative process is imagery in the thought process. If these two assumptions are held to be true then there are some interesting and challenging implications for education to address.

Educational Implications

The first implication for the art educator is the use of guided imagery in the class to expand and further develop the imaginations of the students. The current education process does not encourage the use of imagery to enhance the thought process. Instead the verbal, symbolic processes are stressed in current practices. Nonverbal and
imaginal processes remain virtually untouched by many individuals, teachers and students alike. In the process of reawakening the imagination, guided imagery also seems to be one of the catalysts for creativity.

Gowan supports this premise by stating "What research has now discovered is that imagery is the precursor of creativity in both the arts and sciences." For the educator, imagery could be one of the keys to incubate ideas. It is also a process of introspection, which in itself appears to clarify what is required of students in an educational setting. This is supported by studies conducted by Neisser and Sheehan who state, "introspective reports of imagery can be affected by experimenter effects and perceived demand characteristics (subjects) rated vividness of imagery higher after an introspective inquiry probably because subjects had a better idea of what we wanted." If the objective of the guided imagery was correlated to a specific task requirement as in this study, then it seems that guided imagery becomes useful for thought development, creativity and achievement of specified task requirements.

This latter aspect of guided imagery, may on the other hand, not be as useful as one would desire. The guided imagery process and introspection by students may in fact hinder creativity and thought development because it is perceived as a closed topic with specific outcomes. Creativity and thought development may occur in this state but appear to be more willingly produced in open ended situations. A guided imagery experience can only take a student so far and the rest
must be accomplished by his own conceptual development and creative abilities. One must perhaps be conscious of how guided imagery is then used, for what purposes and to what degree in the learning process.

The use of psychomotor rehearsal in art to develop and refine skills other than ceramics is certainly viable. The researcher believes that any of the skills in art that contain specific motor functions could be rehearsed in this fashion. Some suggested areas for future consideration would be: carving skills specific to its medium, i.e. lino, soapstone, wood, etc.; silk screen construction and inking processes; various forms of print making; and skills required for specific machines such as a potter's wheel, lathe or photographic equipment. Psychomotor rehearsal could also be used to practice the skills necessary for development prior to the use of the materials. This is advantageous not only for the practice of the skill but also for non wasteful use of art materials. For example, in this study, students practiced forming their pinch pot in their minds without using clay, keeping the medium soft and pliable until the students are ready to make their pots.

The rehearsal process does not occupy a long period of time in each lesson in this study, yet the net result seems to be to produce results superior to those from students who have an equal amount of physical practice with the clay. The time spent on rehearsal would be equivalent to that spent on review or questions at the beginning of a
lesson. Psychomotor rehearsal is seen as a valuable learning device, that should be included whenever possible into art skill instruction.

The second implication for educators is the use of scenarios in guided imagery to not only achieve results in the psychomotor domain through mental rehearsal but also in the affective and cognitive domains. A study of tenth grade English students by Gaylean\(^1\) indicates a significant increase in vocabulary and complexity scores for written compositions after using guided imagery techniques. Guided imagery aided in the intellectual performance of these students as measured by Gaylean. There are other reports by individual educators who support the use of guided imagery and claim an improvement in a variety of curriculum areas. Many of these are of a tacit nature and have not been subjected to the rigors of scientific study. However, as suggested in Chapter Two, attention should be paid to the introspective analyses of imagery and its function as a mediator for learning and creativity. The affective domain is currently being addressed by psychotherapists who are using guided imagery techniques as presented in Chapter Two. The positive results reported by researchers such as Horowitz indicate that guided imagery is an effective mediator for the affective domain.

What is needed now is for art educators to deliberately explore both psychomotor rehearsal for artistic skill development, and guided imagery for its functional significance in creativity. Guided imagery and psychomotor rehearsal may have an important and valid role to play in our educational processes.
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22. Shepard, p. 126.


27. Shepard, p. 132.

28. Shepard, p. 133.


31. Bugelski, p. 32.

32. Bugelski, p. 32.


34. Gordon, p. 79.


37. Horowitz, p. 3.
38. Horowitz, p. 3.
40. Arnheim, p. 98.
41. Gordon, p. 78.
42. Gordon, p. 78.
43. Arnheim, p. 254.
44. Arnheim, p. 139.
45. Arnheim, p. 139.
47. Horowitz, p. 106.
49. Richardson, Educational Imagery, p. 18.
53. Richardson, Educational Imagery, p. 27.
54. Richardson, Educational Imagery, p. 6.
57. Richardson, Educational Imagery, p. 18.
58. Richardson, p. 19.

60. Hallman, p. 19.


65. Hallman, p. 25.

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2. Guba, p. 65.


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Chapter Five


5. Gombrich, p. 313.

6. deMille, p. 3.

7. deMille, p. 22.

8. Paivio.


BIBLIOGRAPHY AND REFERENCES

Books


Articles


**Software**