

DEVELOPING CREATIVE THINKING THROUGH CLAYFORMING ACTIVITIES

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Introduction

This study is one in a series exploring the effectiveness of systematic instruction in the figural arts on the cognitive processes of elementary school children. This particular study investigates the effect of specific clayforming activities on the figural and verbal creativity of first-grade children drawn mainly from disadvantaged, minority-group backgrounds. The supposition that instruction in clayforming promotes creativity was supported. Children instructed in clayforming showed significantly superior performance to a control group on posttest measures of "Fluency, Flexibility and Originality" on the Torrance Test of Figural Creative Thinking. The effects were specific to figural creativity and did not generalize significantly to the verbal medium assessed through performance on Torrance's Test of Verbal Creative Thinking. Imagery is discussed as a possible vehicle mediating the observed change.

The visual arts are taking a back seat in current American education. Reading has become the most important skill area in schooling. This is reflected in the amount of time children spend in reading instruction and reading-related activities, and as reflected in the resources spent on reading research, particularly reading research with minority disadvantaged children.

The one place in the school curriculum where art activities still play a major role is in nursery school and kindergarten. The purpose of art instruction there has been to develop creativity and perceptual-motor skills. However, as soon as the children progress into the first grade, the emphasis on systematic art instruction disappears and instruction in art is reduced to making things for special events of the year, such as Thanksgiving, Christmas, and Easter.

A reason for this lack of serious art instruction may be the questionable utility and validity of art activities in fostering educational goals—even such seemingly associated goals as developing creativity. Thus, for instance, in Torrance's¹ extensive review of studies designed to teach and foster creative thought, only three of the 142 studies reviewed used a form of figural arts as the medium of instruction.

There is evidence suggesting that engaging in a form of figural arts can enhance figural creativity.² However, the effects may be modality specific: a study exploring the effects of visual art experiences on the creative writing of eighth-grade students obtained negative results.³

This study, as mentioned in the Introduction, explores the efficacy of specific forms of art instruction in developing a variety of cognitive processes and perceptual motor skills in children of Hawaiian ancestry.⁴ The purpose of this study, then, is to provide some firm evidence on the feasibility of

figural art instruction to develop creative thought in young children.

Clayforming was chosen as the medium because of the plasticity of clay, which allows a child to revise an idea or product, enhance or erase it. Specifically, we hypothesized that guiding children through increasingly complex constructions and methods of working with clay would stimulate the imagination, producing a reservoir of new images that could foster creative responses to figural stimuli and, perhaps, to verbal stimuli.

Method

Subjects

Twenty-six first-grade children participated in the study. The children were enrolled in the school of the Kamehameha Early Education Program (KEEP), a research and development institute. The purpose of this institute is to develop teaching methods and curricula for lower-income Hawaiian youngsters to ease these children's entry into the school system and to make them more successful in school. Many of the Hawaiian children from lower-income or welfare homes do poorly in the regular school system, particularly in the language arts. They are bi-dialectal, with Hawaiian Creole English being their first dialect. These children tend to score higher on performance intelligence items and on tasks requiring visual processing, and lower on standard English measures of verbal intelligence. Half of the children were randomly assigned to the clayforming condition, the remainder to the control condition.

Procedure

Training in clayforming consisted of increasingly complex

steps beginning with simple forming by pinching and pulling, continuing with the joining of parts with slip, moving on to slab and coil construction, and concluding with sculpturing of human figures. The children also glazed and fired many of their products. Clayforming instruction was given by a university professor in art education for two and one-half hours weekly for a period of ten weeks. The control children engaged only in their regular classroom art activities.

Measurement of Creativity and Rationale for Test Selection

The two groups of children were given the *Torrance Tests of Figural Creative Thinking* and, from the *Torrance Tests of Verbal Creative Thinking*, two activities: Unusual Uses and Product Improvement. Form "A" was administered as pretest and Form "B" as posttest.

The greatest obstacle to creativity research is the characterization of creativity. There exists a diversity of definitions and measurement instruments. Here the Torrance tests of creativity³ were chosen to measure creative thinking because these tests have fairly adequate reliability and validity and have been used widely in creativity research.

The figural tests of creative thinking are designed to assess the ability to manipulate creatively figural elements. The individual is given incomplete, meaningless line drawings and asked to complete the figures in a manner that is interesting, different, and that no one else will think of. The tests yield measures on four different elements of figural creativity: fluency, the sheer quantity of acceptable answers; flexibility, the variety of thought categories an individual draws upon in responding; originality, the unusualness of the responses; and elaboration, the degree to which the drawings are embellished.

It was hypothesized that instruction in clayforming would promote processes similar to those involved in the figural creativity tasks and would enhance performance on the figural creativity tests.

The verbal tests of creativity reflect the ability to deal creatively with words and verbal concepts. Only three elements are measured by these tests: fluency, flexibility, and originality. The interpretations of these measures are the same as those just described for the figural tests, except that the content of the responses is verbal rather than figural. Of the two verbal creativity tasks included, the Unusual Uses task requires the individual to come up with as many different uses of cans or boxes as possible while the Product Improvement subtest asks for improvements of a stuffed toy animal.

These two verbal creativity subtests were included as a control measure. It was thought that these tasks require processes that are less related to clayforming activities than the figural creativity tasks. Instruction in clayforming should, therefore, have a weaker effect, if any at all, on the performance of these two tests than on the figural creativity tests.

This outcome was also predicted in light of Frankston's⁶ finding that creative visual art experiences had no effect on poetry writing.

Results

The posttest scores on the various creativity measures were analyzed using the pretest scores as covariates. Separate ANCOVAs were conducted on each of the measures to evaluate differences between the clayforming group and the control group.

Table I shows the results for the figural creativity measures. The children who were instructed in clayforming performed significantly better than the control group on three of the four creativity measures: the clayforming group produced more scoreable responses (fluency), they drew upon a wider range of concepts or categories of thought, and their responses were more unusual and unique (originality). However, clayforming did not appear to affect the degree to which the children embellished their drawings (elaboration).

Table I
Group Means (Adj.) and ANCOVA Results
for the Figural Creativity Tasks

Creativity Measures	Treatment Group		F
	Control	Experimental	
Fluency	12.88	18.05	9.98*
Flexibility	10.52	15.95	13.31*
Originality	18.41	29.05	7.95*
Elaboration	35.22	43.37	1.41

Note: Degrees of freedom for each comparison = 1 and 23

* $p < .001$

Table II depicts the results for the verbal creativity measures. As had been predicted, clayforming affected performance on the verbal creativity measures much less than figural creativity. Although all of the post-experimental measures were somewhat higher for the clayforming group, none of them reached statistical significance at the 95 percent level.

Table II
Group Means (Adj.) and ANCOVA Results
for the Verbal Creativity Tasks

Creativity Measures	Treatment Group		F
	Control	Clayforming	
Fluency	21.23	28.84	0.978
Flexibility	7.95	11.40	3.800
Originality	16.46	19.85	0.276

Note: Degrees of freedom for each comparison = 1 and 23

Discussion

This study supports the conception that systematic engagement in certain forms of visual art activities—in this case, clayforming—fosters figural creative thinking in young children. The observation that the instruction in clayforming was restricted to figural creativity suggests that the effects are modality specific. It also indicates that the differences found are not a function of chance or the result of a Hawthorne effect.

What may have mediated the greater flexibility and originality in the clay-instructed group on the figural tests? Visual imagery is proposed here as the candidate. The importance of mental imagery in learning is reflected in the writings of investigators with widely different perspectives in psychology.⁷ The more specific relationship between creativity and imagery has been stressed by Khatena⁸ and described by Forisha⁹ in her recent thought-provoking review.

A description of both the clayforming task and the creativity test will show, together with an analysis of the cognitive requirements of each activity, how imagery might have been the link between prolonged systematic instruction in clayforming and enhanced performance on the figural creativity measures. The reasoning runs as follows:

During clayforming instruction, the children were given a shapeless mass of clay and asked to create some object. Sometimes the figures they were asked to make were modelled for them, other times only specified, and still other times the children could decide for themselves what they wanted to make. The child then has to think, has to imagine, what he intends to create. Not only must he have an image of what he wishes to make, but he must be able also to visualize the changes the clay must undergo in order to attain his desired goal. At every step, the child must evaluate whether the clay is now shaped more like his intended object; he must continually make adjustments as he works the clay. The difficulty of this task can be seen from the fact that the outcome of the productions are, at times, difficult to recognize. Although the children's fingers are not yet perfectly skilled for expert sculpturing with clay this is not the sole reason for their imperfect products. It is obvious that a major obstacle for them in creating a recognizable object is deciding what aspect of the clay needs to be changed to make it more similar to the desired object. Mental imagery, particularly anticipatory imagery in the Piagetian sense,¹⁰ would seem to be critical in this activity.

Measurement on the Frosting Test showed no increased eye-hand coordination due to the clayforming instruction.¹¹

On the figural creativity tests the children are presented with various incomplete line drawings and told to add lines to the drawings to make as interesting and as unusual objects or pictures as possible. For instance, in one task the incomplete figure has the outline of a sausage and the instructions are to make it into something that no one else will

think of. If a child makes the incomplete figure into a drawing of a sausage in a frying pan on a stove, he obtains a low score for originality. On the other hand, a child who sees the shape as the top of a glass seen at an angle will obtain credit for high originality.

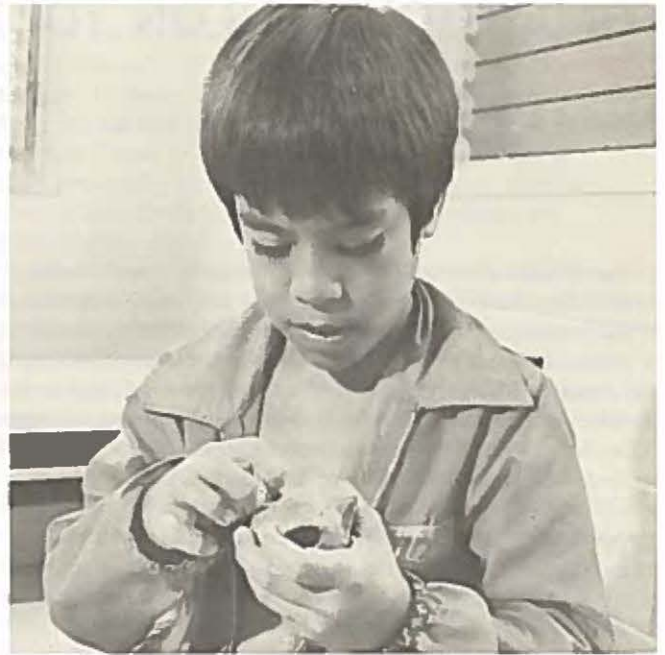
On another figural task, the child is presented with sets of parallel lines and has to make these sets of parallel lines into as many different objects as he can possibly think of. The above analysis suggests that for the completion of the figural creativity tasks, a wide stock of mental images and their ready accessibility is critical. It also points to the similarity of the processes involved in sculpturing with clay and in completing the figures on the creativity measures.

The two verbal creativity tests included appear to draw on somewhat different purposes: in Product Improvement the actual object to be improved is physically present; in Unusual Uses the task is to think of as many things as possible for which one could use a particular item (either a box or a can). Although these tasks also call for some form of imagery, the nature of the images and their accessing would appear to be different from that in clayforming where one must imagine a shapeless blob into a particular object.

Suggesting mental imagery as the mediator of the observed changes in figurative creativity is speculative, but plausible. Eccles, the neurophysiologist, suggested that one of the requirements of creative imagination is that "the synapses of the brain should have a sensitive tendency to increase their function with usage, so that they may readily form and maintain memory patterns. Such a brain will accumulate an immense wealth of engrams of highly specific character."¹² Perhaps the intensive instruction in clayforming enhanced the store of mental images and their ready access.

The next step for further study of the processes mediating the effects of clayforming on figural creativity would be to attempt to obtain a more direct measure of the postulated imagery changes. However, such assessment of imagery is an even more intricate task than the assessment of creativity. The measures of mental imagery are not very reliable and are not highly related to each other.¹³ Indeed, the construct of imagery appears to subsume several different kinds of mental processes.¹⁴

The proposition that mental imagery mediated the changes observed in the clayforming group on the measures of figural creativity, though reasonable, is, at this point, still conjecture. Yet, that does not detract from the observable outcome of the study; namely, that systematic instruction in clayforming enhanced performance on a fairly reliable measure of figural creativity. The educational potential of systematic instruction in at least one type of visual arts media—clayforming—was shown. Further study of how systematic instruction in other forms of visual arts, such as painting and printing, affect cognitive processes will certainly be fruitful.



Footnotes

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⁵Torrance, E.P. *Torrance Tests of Creative Thinking*, Norms-Technical Manual, Lexington, Massachusetts: Personnel Press/Ginn and Co., 1974.

⁶Frankston, *op. cit.*

⁷Paivio, A. "Mental Imagery in Associative Learning and Memory," in *Psychological Review*, 1969, 76, pp. 241-263. Also,

Piaget, J. and B. Inhelder, *Mental Imagery in the Child*, New York: Basic Books, 1971; W.D. Rohwer, Jr., "Images and Pictures in Children's Learning: Research Results and Educational Implications," in H.W. Reese, chairman, *Imagery in Children's Learning: A Symposium*, in *Psychological Bulletin*, 1970, 73, pp. 393-403; W.D. Rohwer, Jr., "Elaboration and Learning in Childhood and Adolescence," in H.W. Reese, ed., *Advances in Child Development and Behavior*, New York: Academic Press, 1973.

⁸Khatena, Joe. "Frontiers of Creative Imagination Imagery," in *Journal of Mental Imagery*, 1978, 2, pp. 33-46.

⁹Forisha, B.L. "Mental Imagery and Creativity: Review and Specialization," in *Journal of Mental Imagery*, 1978, 2, pp. 209-237.

¹⁰Piaget and Inhelder, *op. cit.*

¹¹Speidel and Pickens, *op. cit.*

¹²Eccles, J.C. "The Physiology of Imagination (1958)," in *Readings from Scientific American*, 1972, pp. 31-40.

¹³Khatena, *op. cit.*

¹⁴Yuille, J.C. and M.J. Catchpole. "The Role of Imagery in Models of Cognition," in *Journal of Mental Imagery*, 1977, 1, pp. 171-180.

Also, Forisha, *op. cit.*

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