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Problem-Solving in Elementary School Visual Arts

Abstract

At least a generation of teachers has considered the development of creative problem-solving behaviour to be a fundamental objective in elementary school visual arts. Many, it seems, have assumed that appropriate physical conditions and a positive psychosocial environment could adequately nurture intuitive expressive solutions. With a growing acceptance of discipline-based art education and artistry as intellectual activity, theoreticians and practitioners have started to question whether alternative methods, such as direct instruction, might enhance creativity and develop complex thinking skills. The answer is relative to how creative behaviour is defined, but there is a large body of research suggesting that studio problem-solving skills can be improved with practice and guidance. Selected findings are reviewed in this article, along with many field-tested exercises, to suggest how theory might be translated into practice.

Résumé

Au moins une génération d'enseignants a jugé que l'adoption d'un comportement créatif pour venir à bout de certains problèmes était l'un des objectifs fondamentaux des arts visuels à l'école primaire. Beaucoup, semble-t-il, ont supposé qu'un milieu physique approprié et un bon environnement psychosocial suffisaient à nourrir des solutions expressives intuitives. Devant la reconnaissance de plus en plus grande de l'éducation artistique comme activité intellectuelle, les théoriciens et les praticiens se sont mis à se demander si des méthodes parallèles, comme l'enseignement direct, pourraient renforcer la créativité et développer des modes de pensée complexes. La réponse dépend de la définition qu'on donne de comportement créatif, même si quantité de recherches donnent à penser que les talents de résolution de problèmes en studio peuvent s'améliorer avec la pratique et l'orientation. L'auteur de cet article analyse des constatations choisies et quantité d'exercices qu'on a testés dans la pratique pour suggérer comment traduire la théorie en pratique.

Discussions with several hundred entry-level preservice teachers suggest that, in this population at least, the idea of art as creative problem-solving is easily assimilated. That the skills required could be transferred from mathematics or science, however, seems to provoke dissonance.

Part of the reason for this might be found in the traditions which follow the three subjects. As viewed by student teachers, mathematics and science exercise complex cognitive abilities, while the visual arts develop their opposites – creative intuition and imagination. One set requires knowledge and training; the other, motivation and opportunity. The first is indispensable; the second is relief from tedium and left-brain logic.

In challenge to these apparently widely-held notions is a contention that could lead to an alteration of strategies and to a more respected position for art in the educational mainstream. Artistry, its advocates claim, is cognitive activity which can be nurtured.

This article is an overview of selected research findings related to that contention. It asks, first, what place direct instruction may have in problem-solving in elementary school visual arts programs, and about the relationship between intuition and logic. Second, it suggests how theory might be translated into practice, with field-tested examples of strategies for the teacher. Problem-solving as metacognitive activity is discussed as one means of enhancing perceived success in solution-finding and of encouraging creative behaviour in the classroom.

Cognition, creativity, and problem-solving

The notion of art-making as cognitive activity surfaced in educational literature at least in the seventies, along with demands for reform to the type of elementary school lesson which made studio experiences seem too easy, too much fun, and mindless – all in the name of self-expression (Barkan, 1962; Eisner, 1972; Dobbs, 1979; Chapman, 1982; Gardner, 1983). That direction continued into the 1980s with the art-as-basic-skills and art-as-discipline movements. Their endorsement by leading art educators, and an enlarged conception of literacy and communication in education, helped to provoke dissatisfaction with the *laissez-faire* approach to teaching. In its place was a more serious concern for art as decision-making, analyzing, synthesizing, adapting, elaborating, and selecting, and its facilitation through methods such as direct instruction in problem-solving.

In the midst of the ongoing wave of reform, a core of specialists continued to argue that creativity and the processes of art were nonlinear, holistic, preconscious, and exquisitely powerful. For them, training in problem-solving could only trivialize art production and destroy those unique

qualities which gave it value in elementary school education. Their primary contention can hardly be challenged. Certainly no artist or teacher who has ever experienced a mind-and-heart leap of intuition could deny its existence. Each understands that the assembly of several parts into a whole – the instantaneous or long-sought “aha!” – does happen and each has observed many students displaying a natural fluency and spontaneity – what has been termed “primary creativity” (McPherson, 1956; Maslow, 1959).

Unfortunately, others cannot fully exercise this faculty because of a variety of internal and external blocks that seem to shut out all but repetition and depiction of stereotypes (Torrance, 1962; Eriksson, 1984). For these pupils, the introduction of secondary strategies might be worthwhile; suggestions and guideposts could take creative response out of the realm of magic.

Certainly the notion invites questions. Would there be costs to pay? Would art class become an extension of mathematics and science? And would self-expression be lost?

The response must take three directions. First, neither the **National Art Education Association** nor the most highly respected art educators have advocated a one-sided, logical, reasoned approach devoid of individual emotion or imagination (Lowenfeld, 1968; Eisner, 1972; Arnheim, 1986). Second, artists themselves have tutored educators. They have explained that the products of “inspiration” not only seem to come after long periods of intense work, but also that they usually require revision upon revision. Editing, researching, and reforming are true artistic behaviours. Every pupil should know this and every art teacher should realize this. Finally, it must be remembered that the object manufactured from the artist’s hand and mind is not merely information. Structured problem-solving in mathematics class facilitates achieving end points quite different from those in art, where form, content, and material must evoke a response and provoke a dialogue. There should be no cost and no loss when means rather than ends are altered.

Artists are not the only sources for clues to creative problem-solving behaviours. Classroom experiences with gifted and nongifted students (Armstrong, 1982; Clark, 1983; Gallagher, 1985; Marzano, 1985) suggest that training in secondary techniques and the use of inquiry models at least provide starting points, flexible control, incubation time, and a guide for formative evaluation. The very act of naming procedures and working through a system brings the creative process into being and encourages its transfer to other areas of student life.

Torrance (1962), Arieti (1976), and Rosenfield and Houtz (1977) all suggest that creative behaviour is affected by cultural factors, and especially educational ones. Rules and skills can play a central role, especially when

they are divorced from habits and exercised with care, vigilance, and criticism (Howard, 1977). Proficiency in their use can actually induce higher order achievements (Bailin, 1984; Marzano, 1985).

In summary, what does this mean for the classroom teacher? It suggests that teaching directed solely to the enhancement of either intuition or intellect is just not good enough. It could even "cripple the minds" of young artists (Arnheim, 1986, p. 29).

Theory into practice

Accepting the premise that artistry has a cognitive dimension requiring more than opportunity for release is for some teachers a first step down a relatively new road. The following is offered as an aid in their deliberations about the nature, scope, and sequence of art problems in the elementary school.

Within most of the widely published models of cognitive learning there are simple to complex hierarchies (Bloom, 1956; Armstrong, 1982; Treffinger *et al.*, 1983) and variations of the stages advanced by Joseph Wallas: preparation, incubation, illumination, and verification (cited in Arieti, 1976, p. 15). These can serve as guideposts when it is understood that in the field of art there are often a number of detours and fresh beginnings before closure can be accomplished. Time spans of weeks or even years are not unusual.

Consider first those activities which could be "preparations" for solution-finding. Exercises that encourage trial (and error) and eye-hand brainstorming for ideas and visual forms increase fluency and flexibility. They also instill confidence, develop technical skills, and encourage active learning of the concepts necessary for more complex behaviours – those requiring analysis, synthesis, application, and evaluation. Several examples of these follow. Note that none is to be used as a drill, but rather as an invitation to work up to and beyond given boundaries.

Greater success will be ensured if the limits of media and their psychological effects are considered by the teacher. Heavy-weight handmade paper, expensive fibres, and watercolour paint may be wondrous and inspirational for the mature, professional artist, but for most inexperienced students at any level, they are not. They incite anxiety. Inexpensive trial ("throw-away") materials increase risk-taking, and those which can be overlapped, removed, covered, or reformed encourage exploration. Repetitions and practice with these hone the skills of pupils and provide opportunities for elaborating and combining. Examples of pupil favourites from a number of classroom experiences are listed here.

Examples of exercises for encouraging fluency, building skills, and increasing knowledge:

1. The teacher suggests that pupils practice on “throw-away” papers to discover methods of treating paper edges by tearing and cutting. The skills so learned are used in non-representational collage, or in illustration of a story-book clown’s nose, hair, and collar. (Primary)

2. The teacher encourages the use of materials which allow overlapping, correcting, and reforming. Perceived mistakes can be embellished, removed, discarded, and covered, for example, when nontoxic acrylic is available instead of tempera, when chalk-pastel is substituted for crayon, and when newspaper and marker are used for first life-drawing lessons. The quality of pupil work improves with the large-size paper, with the fluidity of the medium, and, paradoxically, with the notion that the paper has no value. (Junior)

3. To encourage group and individual brainstorming, the teacher invites pupils to modify first ideas and uses of material by adding, subtracting, elaborating, simplifying, enlarging, reducing, borrowing, changing the point of view, fragmenting, merging, turning, and so forth. Pupils might be asked to cover a large sheet of paper with versions of question marks, for example. After a few minutes, the class is encouraged to cooperatively generate a list of methods, and then to return to work with a playful intent to bring to the group the unexpected variation. After several similar class exercises, with a number of topics, pupils should be able to brainstorm independently. (Junior/Intermediate)

The foregoing examples may imply that media manipulation is essential. It is important for technical skill-building, but “thinking aloud” in groups, class discussions, and, above all, repetition and incubation time should not be undervalued in attempting to encourage fluency. Novelty lessons should be discarded and at least a week between initial and developmental activities should be given.

The premise behind the approach is that pupils accumulate knowledge and skills when they are offered a series of sessions with only slight differences to maintain interest. Units replace single lessons, and closure (arrival at product) is often deferred and sometimes omitted. The premise is familiar to most artists, of course, but also to expert instructors of creative dance and writing. They understand that, as pupils overlearn the basics, they begin to elaborate, change, add, subtract, and transform. In short, they exhibit creative behaviour, and they self-actualize, moving from the safety of success to risk-taking.

Many teachers use media as their organizing construct in planning a series of lessons. An example is provided of a sequence with paper conceived

and field-tested with concern for cognitive development and stages of problem-solving.

An example of sequenced studio exercises to facilitate problem-solving with paper:

Intermediate level theme: "Myself"

1. Developing fluency, originality, and flexibility; building skills and knowledge. (One hour or more for any class without previous experience)

The teacher invites pupils to use long, thin strips of cartridge paper and/or a variety of scrap papers to find several methods of altering the strength of the paper, fastening papers together without adhesives, folding for texture and form, treating edges, and converting two-dimensional shapes into three-dimensional forms.

Students are asked occasionally to share their findings and to collaborate to increase the complexity of their experiments.

2. Developing ability to analyze, synthesize, apply, evaluate, transform, and to use metaphor and analogy. (At least three one-hour sessions)

(a) Following discussion, clarification, brainstorming, and analysis of graphic art samples, the teacher invites pupils to use letters cut from discarded magazines and/or torn-paper shapes to represent their names or the phrase "I am" in the colour, size, shape, and font style which match their personality. She asks that they place these on a support paper with attention to the balance and space-use which shows how they perceive their place in a social space.

(b) The teacher asks pupils to construct a nonobjective three-dimensional form which exemplifies a personality trait, such as flexibility, inflexibility, timidity, aggressiveness, or openness. Discussion and throw-away trials are encouraged until students have an image of what they want to create. When several art works are ready for display, selected students are invited to group them by their own unspoken criteria. Discussion begins with agreements and disagreements about the sorting, and about the responsibilities and roles of the participants in the artist-to-viewer exchange.

Up to this point, the exemplars provided have been directed to teachers of art, to suggest how they might guide pupils toward more complex thinking. Now the question of transfer becomes important. Should children be taught to identify and consciously use an inquiry model?

Reviews of research in creativity enhancement (Armstrong, 1982; Martinello & Mammen, 1982; Eriksson, 1984; Gallagher, 1985) suggest that conscious use of a problem-solving pattern can increase higher level cogni-

tive functioning, success in solution-finding, and transfer of methods to new contexts. Several models have been described and evaluated by Armstrong (1982) and Marzano (1985). The paradigm provided in *Design Dialogue* (1983, pp. 111-113) is particularly appropriate for intermediate students in that it can convey the important message that even trained and experienced commercial artists follow a predetermined path which requires recognition of the problem, spontaneous trials, research, clarification, refinement, and resolution.

A similar but simplified set of steps could be followed in most junior art classes: (1) understand the problem, (2) brainstorm from what is given to probable consequences and sequels, (3) choose a tentative solution strategy, (4) carry out the strategy to see if it works, and (5) "learn" (Karmos & Karmos, 1986). Step five requires evaluation and consideration of the implications of the solution. While the level of critical analysis possible is relative to each group, discussion in every classroom will deepen as the year unfolds. The teacher's questions can gradually lead pupils from observation, for example, to exploration of how the artist works and of the function of art in contemporary society.

Karmos and Karmos' five-step problem-solving model has provided a starting point for the outline that follows. It can indicate to art teachers and their students where decision-making and research are expected.

An example of an inquiry model for junior/intermediate visual-art students:

1. *Understanding the problem.* Ask: (a) What is the art purpose? (For example, is the purpose to decorate, to advertise, to inform, to illustrate, to provoke, to criticize, to amuse, or to inspire?) (b) What is my goal, given the limits of the problem? (c) What do I want to say about the subject?

2. *Brainstorming in groups, with media, and with reference to written and visual works.* Ask: (a) Which art forms are probable? (b) What materials are possible? (c) What techniques are possible? (d) What point of view could be taken? (close-up, distant, sympathetic, critical, etc.) (e) Who or what could be the focus? (f) Which principles of design will be important? (g) Where can I find these answers, and who has already found one solution to this problem?

3. *Choosing a strategy.* Ask: (a) What do I already know that will help me? (b) Which strategy will likely bring a solution which satisfies me, the problem and (sometimes) those with whom I want to share my art? (c) What does my solution look like in my mind's eye? (d) What will be my order of operations?

4. *Carrying out the strategy to see if it works.* Ask: (a) Can I actually do what I have visualized? (b) Would it be better for me to brainstorm again? (c) Should I change to a different process or product? (d) Am I finished?

5. *Learning.* Ask: (a) Does my art satisfy the problem? (b) What did I learn about technique, organization, form, etc.? (c) Who else worked on this problem, and what can I learn from that person? (d) How does my work contrast and compare to my own previous solutions, and/or to the work of others? (e) What do I like about my work? (f) What might I try next time? (g) What ideas and feelings are suggested to the viewers of my work?

The inquiry model will be useful to pupils only so far as they possess knowledge of the possibilities open to them at each step. The teacher, who will be the major resource at the beginning of the year, may at first limit choices, such as those for art forms or techniques. As the year unfolds, she must validate growth and eventually give more decision-making opportunities to her students. A September problem for grade six might require pupils to use a crayon stencil-print to illustrate the idea of "crawling"; a June problem might ask grade eight pupils to create an advertisement for a specific product – for a primary child, for a teenager, or for an adult. Note that problem one has defined techniques, but room to interpret "crawling", and that problem two asks students to make a number of decisions and to conduct some research, even before they choose media and technique. This takes art beyond self-expression in some units, but does not exclude it. In both instances, if time is given for trials, brainstorming, and follow-up discussion, then more than one class session will be needed.

Summary remarks

Answers to art problems can seem to emerge intuitively — from preconscious, complex, and as yet inexplicable intellectual activity. Often, though, unique and expressive solutions result from hard work, from time for incubation and revision, from the continuous exercising of higher order cognitive skills, and from a plan of action. These routes can be as important to the developing classroom artist as to the practising professional. Ample empirical and practical evidence suggests that studio problem-solving ability can be improved with practice and guidance, and that teachers could better serve their students and the subject if they planned for these in their visual arts courses.

Central to an understanding of what the ability means in studio practise is recognition of the nonlinear profile of the head/heart/hands/materials interaction. Ideas give way to the limits of the materials, improved skills allow expression of unique concepts, and high emotion colours thought and action. Note that, at every step in the evolution of the art work, cognitive processes are in operation.

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