
Title	Cultivating creativity through project work.
Author(s)	Ian David Smith
Source	<i>Teaching and Learning</i> , 21(1), 1-8
Published by	Institute of Education (Singapore)

This document may be used for private study or research purpose only. This document or any part of it may not be duplicated and/or distributed without permission of the copyright owner.

The Singapore Copyright Act applies to the use of this document.

Cultivating Creativity through Project Work

Ian David Smith

*The little boy went first day to school
He got some crayons and started to draw
He put colors all over the paper.
For colors was what he saw.
And the teacher said... What you doin' young man
I'm paintin' flowers he said
She said... It's not the time for art young man
And anyway flowers are green and red
There's a time for everything young man
And a way it should be done
You've got to show concern for everyone else
For you're not the only one.
From "Flowers Are Red", a song by Harry Chapin*

INTRODUCTION

Project Work (PW) is seen in Singapore as a major method of enhancing students' critical and creative thinking. As part of the 'Thinking Schools, Learning Nation' initiative, launched by Prime Minister Goh Chok Tong in June 1997, the teaching of critical and creative thinking has been given the highest priority by the Ministry of Education (MOE). PW is an excellent way of stimulating such thinking, because it encourages students to draw upon research and knowledge in at least two Curriculum Studies (CS) subjects in solving problems associated with completing their projects. It is proposed that performance in PW be one of the selection criteria for university admission beginning in 2003, and contribute 10% towards a student's total entrance mark. For the past year, several schools have been conducting trials of PW to assist MOE in developing policies that will give teachers guidance in setting and assessing PW. This article will define critical and creative thinking and will then outline some important steps to ensure that PW enhances such thinking by all students.

DEFINING CREATIVITY AND CRITICAL THINKING

Creativity has received increasing attention from educational researchers in the past decade. An important distinction has been made between the **creative product** and the **creative process**. A creative product has two usual characteristics: (1) it is original, unique or novel; and (2) it is useful, adaptive or aesthetically valued by the experts in its field (Russ 1993). Sternberg & Lubart (1995) stated that "creative insights are distinguished by their novelty, as well as their quality and appropriateness". The creative process is divided into four stages (Wallas 1926):

1. **Preparation stage**, where the problem is identified and relevant information about it is gathered;
2. **Incubation stage**, in which ideas are mulled over without the individual working directly on the problem;
3. **Illumination stage**, where a solution to the problem is recognized, often with sudden insight;
4. **Verification stage**, in which the solution is evaluated using logical and critical thinking skills.

Subsequent research (Perkins 1995) has questioned the necessity of the second stage in all instances of creative thinking. Nevertheless, Wallas' stage model of creativity has been generally supported by empirical investigations over the past seventy years.

Another model of creative processes was proposed by Davidson & Sternberg (1984), who argued that insightful thinking requires highly selective cognitive processing. They devised three processes: **selective encoding**, involving discrimination in encoding the relevant attributes of a situation; **selective combination**, involving assembling the elements of a situation into relevant configurations; and **selective comparison**, involving the discovery of unusual links between new and old information. A third model of the creative process was devised by Perkins (1995), who talked about **Klondike spaces** in a given field of knowledge, where creative searches take place in "possibility spaces with vast, relatively clueless regions, in the midst of which occur small pockets rich with clues, in which rapid progress can be made" (Perkins 1995:496). An important distinction about the creative process was made by Guilford (1968), who distinguished between **divergent thinking** and **convergent thinking**. Divergent thinking proceeds from a problem to produce multiple solutions, whereas convergent thinking occurs when

there is a single correct answer to a given problem. Guilford believed that too many problems set in school examinations and class exercises require convergent thinking, rather than divergent thinking.

According to Marzano (1992), **critical thinking** involves the use of declarative knowledge (i.e. knowing **that**), procedural knowledge (i.e. knowing **how**), and conditional knowledge (i.e. knowing **if**) in order to solve a problem. Critical thinkers are able to evaluate what they read and use it selectively in making decisions and in completing essays, reports and projects. They sift through evidence downloaded from the Internet, judging its appropriateness for their purpose, rather than accepting everything they read as truth. As outlined above, creativity involves critical thinking in its fourth or verification stage, when new ideas or products are tested to ensure that they are functional.

TEACHING FOR CREATIVITY

Enhancing children's creativity is the cultural imperative of the twenty-first century. It has been estimated that in the United States, about 80% of new jobs are located in the 'knowledge industry', with about 50% in the rest of the world. Knowledge has to be **generated** as well as **transmitted** in these jobs, so creative abilities will be required extensively.

The various models of teaching aimed at enhancing students' creativity may be divided into those that aim to teach creative thinking skills directly and those that integrate the teaching of creative thinking skills into the regular curriculum. Edward de Bono's CoRT programme is an example of the former approach, while the integrated approach to teaching thinking skills being implemented in Singapore secondary schools, such as history, is an example of the latter model. Briefly, de Bono (1992) believes that creative thinking, or "lateral thinking", as he calls it, deserves to be taught as a separate subject so that students have many opportunities to learn and practise the thinking strategies taught in the programme. Time and effort are required for mastering lateral thinking strategies such as the **Six Thinking Hats** method, in which students learn six different ways of solving a problem, and for overcoming old habits of logical or vertical thinking. De Bono found that even primary school pupils can learn to use lateral thinking to solve common problems, such as designing a dog-exercising machine for disabled dog-owners.

The alternative approach to teaching creative and critical thinking is to integrate it within the regular curriculum. This process is often called the "infusion" approach, which "is based on the fusion of information that is taught in the content areas with forms of skillful thinking that we should use every day to live productively" (Swartz, Fischer & Parks 1998:3). Some Singapore schools are experimenting with this method in a number of teaching subjects, such as history. The approach is eclectic in that it combines a number of models to the teaching of creative and critical thinking in order to produce materials and strategies for teachers to use when introducing students to new material. Ideas from Madeline Hunter's mastery teaching, Marzano's tactics for thinking, McCarthy's 4MAT, Johnson and Johnson's cooperative learning, as well as de Bono's CoRT model, are used to design instructional modules which consist of the following sections: Warm Up; Teach Content; Summarize Content; Build Skills; and Follow Up. This infusion approach has been so successful in promoting critical thinking in history that it is being extended to other subjects in the Singapore secondary school curriculum (Ang & Chang 1997).

TEACHING AND ASSESSING PROJECT WORK

From 2003, PW will contribute 10% towards the total entrance mark of students seeking admission to university. This innovation will present teachers and students with a unique opportunity to cultivate creativity in the classroom. Although PW assessment will most immediately affect students and teachers at the pre-university level, PW will also be introduced to primary and secondary schools, beginning in 2000.

It was the famous American philosopher, John Dewey (1899), who first popularized the **project method** as a teaching-learning strategy around the turn of the twentieth century. He founded the laboratory school at the University of Chicago in order to promote his ideas about student-centred learning and the experimental method. He wanted students to be active learners as they completed projects, which required them to do research in order to solve problems and to produce a creative product. These projects usually involved the students in crossing traditional subject boundaries in search of knowledge.

Dewey's philosophy lies behind Singapore's approach to PW, which aims to encourage students to draw on knowledge from at least two CS subjects. PW cuts across traditional subject boundaries and brings together various aspects of the curriculum to focus on a particular topic. Each group of four to five students will collaborate to

produce an interdisciplinary project. The group will, with the assistance of a teacher, devise a plan to complete the various tasks necessary for the completion of the project. Their learning strategies will include:

1. brainstorming to decide how they will approach the topic;
2. deciding what resources are available;
3. devising a time management plan to complete the project on time;
4. allocating the various tasks to the individual members of the group;
5. gathering information about various aspects of the topic;
6. organizing and analyzing their research findings;
7. generating ideas about writing their project report;
8. integrating the information into a coherent report; and
9. evaluating the quality of the final draft before submitting the report.

The teacher's role is that of a facilitator and coach. He/she should encourage students to take risks and perceive mistakes as being part of the learning process. The teacher may not know everything about any given topic, but can suggest where students might begin looking for relevant information. He/she can help clarify problems, rather than provide answers to all questions: students will be encouraged to take responsibility for asking their own questions and searching for the answers. The teacher also needs to assist students in their meta-cognitive and motivational development. The following teaching strategies achieve these goals:

1. Increasing students' awareness of their role as active learners in researching and producing a worthwhile project report;
2. Urging students to use the learning strategies outlined above;
3. Structuring the classroom environment to challenge students to make reflective, rather than impulsive, decisions; and
4. Praising students for their efforts and achievements, as well as by correcting their errors diplomatically.

Assessment of PW is a critical part of the learning process (Mau 1997). The process and the product will be assessed. The processes of collaborating, planning, acquiring information, synthesizing knowledge and presenting it via an oral presentation and a written form will be assessed for all individuals in the group. Teachers may prepare progress assessment forms comprising columns for the student's name, date, the assigned tasks, what has been completed and teacher verification/signature. Teacher comments need to be carefully written, focusing on

using appropriate, constructive strategies to improve the student's project work, without directing the student's activities too prescriptively. Thus, **formative assessment** would be designed to assist the group's progress towards the final report, and check that each member is contributing towards the common goals. On the other hand, **summative assessment** occurs upon completion of the project and is based on a number of criteria, such as effectiveness of communication, including the appropriate use of information technology (IT); evidence of creative and critical thinking; accuracy of content; and collaboration skills, as indicated on the progress assessment form. It is important that both **process** and **product** of PW are assessed, so that students' critical and creative thinking skills are recognized and rewarded. The aim of PW is to find out what the students are able to **do**, rather than what they are able to **memorize** for an examination, for much of the latter is forgotten soon after the examination.

Thus, by creating a classroom atmosphere of curiosity and discovery, teachers will enthuse students by example. When teachers encourage students to ask questions and discover alternative answers on their own, students will engage in what Bruner (1966) calls "genuine learning", rather than rote learning. They will remember what they learn far longer than if they had been told the answer. Students will search for answers in sources such as the Internet. Other learning resources include databases on CD-ROMs and library catalogues. Teachers may organize excursions to give students a first-hand learning experience, go to a museum, or have a 'virtual reality' experience. Vital lessons may be learned through cooperative PW, with only general teacher supervision.

CONCLUSION

Cultivating student creativity begins with a teacher who is curious and enthusiastic. Brophy & Evertson (1976) found that effective teachers believe that they **can** make a difference in students' learning and achievement. They radiate an enthusiasm for their subjects and for learning, which is infectious. By modelling curiosity and creativity, teachers send a signal to students that creativity is 'cool' and will be recognized. If Singapore is to embrace the knowledge economy of the twenty-first century, it will need workers who actively embrace change and adapt quickly to the demands of globalization. By cultivating creative attitudes in students, teachers are preparing their students for the world of work, which is challenging and exciting. Teachers will need

to persevere in the face of obstacles and even failure, and keep their eye on the big picture of cultivating creative and critical thinking in their students in order to achieve the nation's and their own goals.

Ian David Smith is an Associate Professor in the Division of Psychological Studies at the National Institute of Education, Nanyang Technological University. His research interests are in the field of self-processes in the development of the child and their relationships with educational achievement. He is also interested in the relative advantages and disadvantages of co-educational and single-sex schooling.

REFERENCES

- Ang, W.H. & Chang, A.S.C. (1997) Preparing students for learning and thinking. *Preparing Children and Adolescents for the Next Millennium*. Proceedings of the Ninth Asian Workshop on Child and Adolescent Development. Bandar Seri Begawan: Universiti Brunei Darassulam.
- Brophy, J.E. & Evertson, C.M. (1976) *Learning from Teaching: A Developmental Perspective*. Boston: Allyn & Bacon.
- Bruner, J.S. (1966) *Toward a Theory of Instruction*. Cambridge, MA: Harvard University Press.
- Davidson, J.E. & Sternberg, R.J. (1986) What is insight? *Educational Horizons*, 64: 177–179.
- de Bono, E. (1992) *Serious Creativity*. New York: Harper.
- Dewey, J. (1899) *The School and Society*. Chicago: University of Chicago Press.
- Guilford, J.P. (1968) *Intelligence, Creativity, and their Educational Implications*. San Diego, CA: Knapp.
- Marzano, R. (1992) *Teaching with Dimensions of Learning*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Mau, R.Y. (1997) Using assessment of project work to teach thinking. *Teaching and Learning*, 18: 1–8.
- Perkins, D.N. (1995) Insight in minds and genes. In R.J. Sternberg & J.E. Davidson (Eds.), *The Nature of Insight*. Cambridge, MA: MIT Press.
- Swartz, R.J., Fischer, S.D. & Parks, S. (1998) *Infusing the Teaching of Critical and Creative Thinking into Secondary Science*. Pacific Grove, CA: Critical Thinking Books & Software.
- Sternberg, R.J. & Lubart, T.I. (1995) An investment perspective on creative thought. In R.J. Sternberg & J.E. Davidson (Eds.), *The Nature of Insight*. Cambridge, MA: MIT Press.
- Wallas, G. (1926) *The Art of Thought*. New York: Harcourt, Brace.