

Creativity: What Is It? Can You Assess It? Can It Be Taught?

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Abstract

This article takes the subject of visual arts in Sweden as the point of departure in a discussion of how, with the help of portfolios, assessments may extend to include both the unpredictable and the ambiguous. The notion that assessments of learning outcomes must be either limited to superficial knowledge or completely arbitrary is shown to be a misconception. The author has made a study of the progression of young people's creativity in the visual arts from preschool to upper secondary school. The assessment was based on both product criteria and process criteria (investigative work, inventiveness, ability to use models, capacity for self-assessment). The materials assessed were portfolios of work containing sketches, drafts and finished works, log books, sources of inspi-

ration and videotaped interviews with the students.

Is there any progression in students' visual design, in their ability to work independently and assess their work? What is the degree of correlation in the assessments of different judges of student portfolios? These are some of the questions that this article attempts to answer, which concludes with a discussion of how schools can build a culture of learning that fosters the creative powers of young people.

Introduction

'The school is responsible for ensuring that all pupils completing compulsory school have developed their ability to express themselves creatively', states the 1994 Swedish Compulsory School Curriculum [1]. The broader statements in curricula about the kind of person, the kind of knowledge and the kind of society that school is supposed to promote are often referred to in the educational debate as 'the poetry section'. It has been generally accepted that these are high ideals that are diffuse by nature and difficult to translate into the everyday reality of school.

What, then, is creative ability? Can it be expressed in words? Can it be assessed? Does any development take place? What part does the student's background play? And can creativity be taught? These questions served as the guidelines for a study entitled *Portfolio Assessment of Creativity in the Visual Arts* carried out by the author with two colleagues from the Stockholm Institute of Education: Leif Ulriksson and Catharina Elsner [2]. This was one of five studies that made up the National Agency for Education's *Evaluation of the Swedish Educational System, 1998, with regard to the New Curricula (US98)*.

Earlier national studies were based on random samples of about 9,000 students in a particular year, who completed questionnaires, attitude forms and written tests in a range of subjects. The 1998 Evaluation tested a new approach, which consisted of a number of in-depth studies of comprehensive, cross-curricular competencies in the latest curricula (Lpo 94/Lpf 94). Of particular interest to the National Agency for Education were competencies that required methodological development and innovative thinking to make them assessable. The researchers involved in the project were encouraged to apply 'innovative and open thinking, without giving too much consideration to the structure of traditional evaluations of education' [3].

The study of creativity produced a number of unexpected results. Or, to put it another way, it suggested that some of the prevailing views

about children and the visual arts owe more to preconceived notions than to facts. Readers who are interested in these sections of the study are referred to the research report [4] and related article [5]. Here, I shall focus instead on the methodological development that took place in the project, and on how portfolio assessment, criterion-referenced judgement and grading may be used to nurture creative ability.

What is creativity?

While a visiting scholar at Harvard Project Zero in 1991, I had the opportunity to study Arts PROPEL, a programme of curriculum development in the areas of the visual arts, music and imaginative writing [6]. This programme encourages students to reflect and to make their own observations about their work. Students reflect on the purpose of their work, on decisions they have made, or on their strengths, weaknesses and achievements. Norman Brown, a visual arts teacher, took part in the project; Ella Macklin was one of his students. At the end of Ella's second year in high school, Norman and Ella went through her voluminous portfolio [7]. It contained a book of sketches and notes and close to twenty works, accompanied by accounts of the way they had progressed. They discussed what Ella had learned while working on her *family series*. She leafs through her file and pulls out an early drawing of her father, who is holding her (Figure 1). In working on this picture she had to decide which was most important: expression or a naturalistic depiction of reality. Ella remembers:

I felt that I didn't draw the arm right. But I changed my opinion of it when we talked about Matisse in class, and I saw pictures in art magazines where the arms are somewhat distorted. My dad is just like that arm. I mean, he is really protective.

Ella now began to recognize that she had the right to develop and alter the actual content of her family photographs. The portfolio contains a portrait of Ella and her grandmother.



In my family photo album at home she's sitting on the couch in the living room, and the photo shows the whole living room. But I just wanted my grandmother and myself, so I decided to put the picture in an outdoor setting.

Norman comments on the way the open, airy landscape brings Ella and her grandmother into focus. He turns the attention towards the visual design of her drawing, and Ella remarks on the way the soft, rounded shapes convey a sense of shared intimacy.

I think there is more to this picture, ... You see the way my grandmother's body hugs me. It is strength; it's warmth; it's caring. I think pastels help achieve that - they can be blended and they can be smoothed even. Or they can be left rough in certain areas, where you want it to be highlighted.

Ella pursued what she called 'this family quality', that is, the intimacy she has captured with the help of soft shades in pastel oils - a surrounding, embracing intimacy. A catalogue from a Harlem Renaissance exhibition and a visit to the Carnegie

Museum sparked her imagination. Ella found other artists there, among them Giacometti, who had confronted similar problems of visual design. The visit to the museum made her question the individualisation that had hitherto been a characteristic of her family portraits:

One of the things that I noticed, was that the paintings, and even some of the sculptures, didn't have a face ... So I could interpret it; I could put myself into the picture; I could put in my own feelings ... This began the universal series that I later developed, in which you have an adult holding a child, a mother holding a daughter, whoever.

Ella began to draw more of her figures with less detail. One was a mother holding her child on a swing, a theme that culminated in Ella's plaster sculpture of a parent lifting a child (Figure 2):

I liked the way the quality of Giacometti's Walking Man was rough; it was a very rough bronze statue. I attempted to create that same roughness. Even though you have good relationships with your parents, you still have arguments. You have

This page:
Figure 1
Father
Figure 2
Sculpture

rough edges in a relationship. So I left that rough quality. Because to smooth everything would be very unrealistic.

Later, she returned to the theme of parents with children, and produced a simple line drawing and a series of prints in different colours.

This is an illustration of the kind of learning that occurs in creative activity, provided the students are given the opportunity to constantly make new observations and reflect on what they have done. Ella's description of her work process confirms the findings of other case studies, not only of artists [8] but also of children and young people [9]. These studies show that creative work has a number of dimensions, among them the ability to adopt a number of different stances or perspectives, to harness both cultural and social resources, and to pursue ideas for a period of time long enough to allow the sources of problems to be identified, and ways of solving them to be found. These performance or process qualities can scarcely be measured objectively. Neither can we measure the 'beauty' or similar qualities of the finished product. Nevertheless, as John Dewey points out in *Art as Experience* [10], this does not prevent us from employing various *criteria* to judge the qualities we appreciate in a painting or, for that matter, in an essay, a scientific experiment or a historical study.

In evaluating creative performance for Sweden's National Agency for Education in 1998, we tested *seven criteria*. Three of these concern finished products, while four concern the work process. The selection is based on objectives formulated in the national curricula, on qualities that are appreciated in the art world, and on research into the creative process. The *product criteria* comprise: (1) the visibility of the intention behind the picture or pictures (the student's visual work communicates what he or she intended); (2) colour, form and composition (the student achieves desired effects with the aid of visual elements and principles); (3) craftsmanship (the student masters materials and techniques).

Process criteria describe: (4) investigative work (the student pursues a problem across several works or experiments, feels challenged rather than discouraged by difficulties); (5) inventiveness (the student sets up problems, tries new solutions, is willing to take risks); (6) the ability to use models (the student actively searches out models to emulate); (7) capacity for self-assessment (the student describes and reflects on different qualities in his or her work). In addition, we included (8) an overall judgement in which the teacher takes into account what degree of difficulty the student masters, his or her capacity to work independently and other factors of significance.

Can creativity be expressed in words?

Approximately 500 children took part in our study of creativity in the visual arts, from preschool (5-year-olds), through the second, fifth and ninth grades (8-, 11-, and 15-year-olds) of the compulsory comprehensive nine-year school, to the final year (19-year-olds) or concluding courses in the arts programme of the upper secondary school. The study was carried out in Jönköping [12] and Stockholm from 1997 to 1999. The material studied consisted of *portfolios* whose contents, in addition to a final product, included sketches and drafts, reflections in logbooks, models used as sources of inspiration and a short videotape interview with each student. The portfolios documented the students' work over a period of 10 hours (nine-year comprehensive school) or 30 hours (upper secondary school). During this time, the students worked within a visual arts theme of a divergent nature, that is, a theme that could be approached in a variety of ways, which was selected by the teacher.

All of the students' portfolios were independently assessed by both the student's own teacher and a teacher at the same grade level from another school. A general definition of what was to be assessed was formulated for each of the seven criteria. The following quotation is an extract from our description of 'capacity for self-assessment':

Creative people often possess an ability to adopt a number of different stances or perspectives. When they look at their own work, they focus alternately on the technical aspects, the visual design, the ideas, and so on. They develop a set of standards or a checklist that directs their attention and helps them to monitor the creative process. In addition, they master a vocabulary that enables them to assess their work in multiple dimensions, so that they can pass more qualified judgements than just 'good' or 'bad.'

A capacity for self-assessment is not innate, it is something that students can develop and refine. A student with a high ability to evaluate his or her own work can leaf through their portfolio and reflect upon the content, on both the themes addressed and the materials and techniques, and also upon colour, form, and composition. He or she can point out works or parts of works that are successful or that require continued work, and they can give reasons why. He or she can point to decisions taken in the course of the work and explain why they chose to do something in a particular way (for example, why they chose a particular colour or arrangement). He or she may also be able to say how the choices they made affected their pictures and reflect upon how their future work may benefit from the experience they have gained [13].

For each criterion the assessors had to choose between *four rubrics*, each with 'plus', 'medium' and 'minus' (that is, a 12-grade scale), presented in a teacher's manual. These rubrics describe levels of performance on an ascending scale. They correspond to the development from *novice* to *expert* outlined by the Dreyfus brothers in *Mind over Machine* [14] and thoughts about rubrics design put forward by Goodrich [15], Wiggins [16] and others. The development proceeds from solving simple tasks with assistance to tackling complicated problems in an independent and confident way. This description corresponds particularly well to the progression

on our process criteria (Table 1). The lowest level (*novice*) is characterized by expressions such as, the student 'does only what the teacher requires'. Descriptors at the next level include the student being able to assess his or her work 'with some help' and 'take a problem the teacher has set and change it slightly'. At the highest level, students develop the work on their own, set themselves problems to solve, actively search out models, can justify their preferences, and so on.

Good descriptive rubrics, supported by examples of both high quality and less satisfactory work, help students to assess their own work and to understand what qualities of performance the teaching aims to achieve. The rubrics should satisfy the following requirements:

- **They should be sufficiently general so that their connection with the overall goals is evident.** Rubrics that apply only to a particular assignment are more concrete and easier to apply. However, such rubrics may obscure the broader educational objective for which the assignment was designed, and may unnecessarily limit the freedom of students and teachers to demonstrate knowledge and skills by various means.
- **They should be descriptive.** That is, they should describe unique and typical characteristics of performance at different levels. To be informative, they should refrain from using purely comparative and evaluative language, such as 'better composition than' or 'poor composition'.
- **They should be described in equivalent terms.** Descriptors should make it clear that the assessment is based on the same criterion; new dimensions, explicit or implicit, should not be introduced in the transition from one level to another.
- **Rubrics should be neither too many nor too few.** There should be enough levels to separate and identify important qualities, but there should not be so many that they become impossible to distinguish one from another.

Table 1: Process criteria with rubrics

Process criteria	Expert ← → Novice			
	Investigative Work	Takes considerable pains, approaches themes and problems in several different ways and uses drafts, sketches or test work to develop the work.	The student does not give up in the face of difficulties, preferring to concentrate on a particular approach that she begins to develop and refine.	Demonstrates a degree of patience, tries out her own solutions and approaches, but does not develop them.
Inventiveness	Often sets up problems or reformulates the problems set by the teacher. Makes consistent progress and experiments regularly, is willing to take risks and often finds unexpected solutions to problems.	The student sometimes sets herself problems. She develops her knowledge, experiments fairly often and sometimes finds unexpected solutions to problems.	Can take a problem the teacher has set and change it slightly. Shows tendencies to experiment and play with colour, form and composition, or materials and techniques.	Does not set herself any problems, shows no sign of experimenting with colour, form and composition or materials and techniques.
Ability to use Models	Actively searches out models to emulate and can use them in her work in a multifaceted, independent and well-integrated way.	Makes active efforts to find pictures for her own work. Demonstrates an ability to select images that suit her intentions.	The student shows an interest in other people's pictures that she or the teacher has found, but she confines herself to copying them.	Shows no interest in other people's pictures and cannot benefit from them even when the teacher has helped find them.
Capacity for Self-Assessment	Clearly identifies merits and shortcomings in her own work and can select sketches, drafts and works that illustrate her progress. Can justify opinions and explain why a particular result was obtained. Can produce qualified judgements of peers' work and contribute constructive criticism.	As a rule, manages to see for herself the merits and shortcomings in her work, and can select sketches, drafts and works that illustrate her progress. Is beginning to produce qualified judgements of peers' work.	With some assistance, can identify her strengths and weaknesses and differentiate between good and less successful work. Her views about her peers' work are limited to subjective preferences (good/bad, like/dislike).	Cannot identify strengths and weaknesses in her own work or differentiate between good and less successful work. Has no views about the work of her peers.

From the educative viewpoint, three levels are perfectly adequate, says Peter Elbow [17], who considers the important factor to be that the assessment is multidimensional, and not that it differentiates many levels.

Can creativity be evaluated?

All student portfolios in our study were assessed independently by both the student's own teacher (the class teacher) and by a teacher who taught

students of the same age at a different school (the co-assessor). The assessors used a teacher's manual containing our descriptions of the seven criteria of creative ability and the four levels of performance for each of these criteria [18]. They also judged, at each level on a criterion, whether the portfolio demonstrated performance that was slightly below, on a par with, or slightly above the average described in the manual. As a result, the level on each criterion was assessed on a 12-

grade scale. Such a finely-graded scale was essential for research purposes, because we wanted to make statistical comparisons of students between the ages of 5 and 19.

We compared the assessments of the class teachers and the co-assessors, applying all criteria on 458 portfolios gathered from 22 classes in 17 schools (later on, another set of 32 portfolios from six preschools were similarly collected and assessed). If there had been major discrepancies in the judgements, with considerable differences between assessors, the criteria and levels described above would not have been accepted as a reliable instrument to assess and judge students' creativity. Possible causes would be imprecise definitions of the criteria, inconsistencies in the criteria, the quality of the material gathered (the portfolios) being inadequate, highly idiosyncratic preferences among assessors, or irrelevant circumstances affecting the assessment.

One of the methods we used to study the reliability of assessments was to calculate the frequency with which the judgements of the class teacher and the co-assessor differed by two steps or less. We considered a difference of two steps on a twelve-grade scale to be acceptable, particularly as the teacher's manual contained verbal descriptions of only four levels of performance. Assume that Leif's portfolio was assessed by applying the 'Inventiveness' criterion. The class teacher gave him a score of six while the co-assessor scored his performance as being no better than four. Both judgements are compatible with the following rubric: *The student can take a problem that the teacher has set and change it slightly. He shows tendencies to experiment and play with colour, form, and composition, or with materials and techniques.* Even in cases where a difference of two gives a different standard, we regard this outcome as fully acceptable. After all, judgements contain a subjective element that defies precise verbal description; they presuppose that the teacher uses his professional judgement in interpreting criteria, levels and the content of portfolios.

We found high agreement between class teachers and co-assessors in ratings of both the students' visual results (product criteria) and their approach to work (process criteria). In almost 3,100 comparisons between class teachers and the co-assessors from another school, there was 78 per cent agreement (≤ 2 steps on a twelve-grade scale). Given that other discrepancies between the two assessors were small and indicate an approximately normal distribution, this may be regarded as a satisfactory result. Were we to consider the differences of three steps or fewer as negligible, which would not seem unreasonable, then the level of inter-rater agreement would be as high as 90 per cent. Thus, the study effectively refutes the idea that only superficial knowledge and skills can be assessed and evaluated. By using criteria related to visual design and students' work habits, we managed to evade the assessor's Scylla and Charybdis, that is, a tendency to place undue emphasis on students' skills in the use of materials and techniques on the one hand, and a judgement based solely on idiosyncratic preferences on the other.

The results of our study are in conflict with the view that process criteria are intrinsically difficult or impossible to assess. They suggest, however, that assessment of processes of learning requires the students' thoughts to be made accessible in a more explicit way than normally happens. It was not until we supplemented the students' logbooks with the videotaped interviews that different assessors arrived at similar results. The interviews addressed the students' capacity for self-assessment and their work processes step-by-step. The appropriate criterion, that is, what dimension of performance a question is primarily intended to highlight, is given in brackets below:

What task have you worked on?
(Criterion 1: Visibility of the intention)

Choose a picture that you like. Explain why.
(7: Capacity for self-assessment – quality)

Choose a picture you are less satisfied with. Why don't you like it so much? (7: Capacity for self-assessment – quality)

Choose a picture that says something about your way of expressing yourself. How can one see that it is your work? (7: Capacity for self-assessment – personal style)

What did you want your pictures to state or express? (1: Visibility of the intention – can the picture stand by itself or does it require an explanation?)

What inspired or suggested your pictures? (6: Ability to use models – how actively and independently did the student use models and cultural resources?)

What problems and difficulties did you encounter during the work? How did you go about resolving them? (Criteria 4, 5, and 6 – information about the work process)

Have you attempted something you have never done before? How did you get on? (5: Inventiveness – the courage to try something new and the ability to learn from experience)

Choose a picture from which you learned something new about making pictures. What did you learn? (5: Inventiveness)

Choose a picture that you would like to change or redo. What would you do with it? (7: Capacity for self-assessment; 4: Investigative work – the ability to develop an idea)

How much help did you get? Who helped you and how? (This question is relevant for assessment with reference to all the criteria.)

Extracts lasting about five minutes each, from 46 videotaped interviews, were converted to digital format. Together with the students' portfolios,

these were put as illustrations on a CD-ROM that we produced as an appendix to the final report [19]. These interviews serve not only as illustrations of various dimensions of performance, and as a demonstration of the kind of evidence on which students' portfolios were assessed. They also have an intrinsic value as a source of knowledge about the way Swedish children and young people at different ages and in different types of school approach creative work.

Does any development occur?

A high correlation between independent judges is a necessary but insufficient condition for assessment outcomes to be accepted as valid. Another condition is that the ratings on different criteria are independent. Everyday experience, as well as empirical evidence from a few similar studies [20], directed our attention to the risk that both the class teacher and the co-assessor form a general impression of a student's work, which then influences their assessment on each individual criterion. It is still interesting that the class teacher and the co-assessor often had a similar general impression of a portfolio. However, a tendency to over-generalize would make ratings on individual criteria less valid.

To examine this source of error, we recruited 30 students who were close to completing their training as art teachers. Each of them was asked to assess a large number of portfolios, including videotapes, using a single criterion. They were to ignore other aspects of the portfolios than those defined by that criterion. Thus a student art teacher judging pupils' 'inventiveness' had to examine all portfolios from that viewpoint alone, and ignore, for example, how successful the final product was. The portfolios were anonymous, and were sorted in random order to make it more difficult to estimate the sex and age of the pupils.

Although this procedure took several days, it proved to be a good investment. A factor analysis (i.e., a statistical technique that allows for the reduction of variables representing a particular construct) supported the assumption that teach-

Table 2: Median values on criteria for creative skills in the visual arts in comprehensive school. Assessors: student art teachers (individual criteria) and class teachers (overall judgement).

	Visibility of the intention	Colour, form, and composition	Craftsmanship	Investigative work	Inventiveness	Ability to use models	Capacity for self-assessment	Overall judgement
Grade 9	7	7	8	7	6	6	5	8
Grade 5	7	5	5	5	5	5	5	6
Grade 2	7	3	5	6	6	5	4.5	6

ers' judgements were strongly influenced by their overall impression of a portfolio. However, with the more independent judgements that the student art teachers made, we obtained two main factors: 'product criteria' and 'process criteria'. All the process criteria were loaded on a common factor, as were the product criteria. None of the seven process and product criteria appeared to be multidimensional, that is, to be a manifestation of qualities in both process and product. This outcome supports the hypothesis, on which this present study is based, that creativity in the visual arts contains two main dimensions, product and process, that must be considered separately when assessing students' work. At the same time, the results show that teachers need training in applying one criterion at a time, if they are to evaluate various qualities in their own teaching and give useful feedback to their students.

The outcome of the student art teachers' assessments indicates that pupils in the comprehensive school improved their visual design and artistic skills. That is, they made progress on two of the product criteria, one which describes elements and principles of design, such as colour, form and composition, and the other the use of materials and techniques (craftsmanship). However, with regard to process criteria, referring to their capacity to work independently, evaluate their work, and so on, students in ordinary comprehensive school classes appeared to stagnate or show only insignificant improvement (Table 2).

Since it is ultimately the products of the creative process that count in society, there may be reason to question the relevance of the process criteria. If the art works steadily improve, does it matter how the improvement comes about? To answer that question, we must examine the content of the process criteria. The result for *investigative work* shows that the average student at the junior and intermediate grades 'tries out her own solutions and approaches, but does not develop them' (Level 2 in the transition from *novice* to *expert*, see Table 1). The same applies to boys in the final grades of comprehensive school, whereas girls at that age begin to develop the approaches they have chosen (Level 3). As regards *inventiveness*, most students, irrespective of grade and sex, can 'take a problem that the teacher has set and change it slightly'; they also show 'tendencies to experiment' (Level 2). On the other hand, they do not set up problems of their own, and they have not begun to experiment regularly (Level 3).

Most students in the comprehensive school lack an advanced *ability to use models*. They show an interest in other people's pictures that they or their teacher have found, but they confine themselves to copying them (Level 2); they do not actively look for pictures or genres to get ideas, and they are unable to select what can be of particular use to them (Level 3). The ratings on *capacity for self-assessment* show that most students in the comprehensive school can, 'with some assistance', point out strengths, weaknesses and other characteristics of their work (Level 2); on the other hand, they do not achieve

this on their own, nor can they select sketches, drafts, and works that demonstrate their own progress over time.

This examination of what the process criteria are referring to, testifies that these criteria are significant in their own right. They show how well the school has achieved one of its overall goals: the development of students' creative skills from solving simple tasks with support to tackling complicated problems in an independent and confident way. This is the very core of the development from apprentice to master, from novice to expert in a domain. Using a terminology that underpinned the latest Swedish curricula, we can say that the students in our study acquired *knowledge* and *skills* as regards how to design images. However, they did not develop the *understanding* and *familiarity* that is required to apply what they have learned to new situations or to rely on their own judgement.

Criterion-referenced assessment, applied by teachers and students, can draw attention to the processual dimensions of creative work and articulate the 'tacit' knowledge [21] or 'dispositional' characteristics [22] that these criteria are referring to. To that end, guidelines for what should go into the portfolio must take into account not only the quality of the product or performance, but also the student's ability to reflect upon her work and choose appropriate materials, techniques and content. A student with sophisticated reasoning and an appropriate approach may still hand in flawed or careless work, while a less sophisticated student can produce painstaking and well executed, albeit simple, work. With a multidimensional assessment, each of these students will be both acknowledged for her achievements and encouraged to progress.

Can creativity be taught?

A multidimensional assessment gives students *feedback*, which helps them discover their strengths and identify areas in which they need to improve. The scores on such assessments can also help an educational programme to review its

results, consider its position and modify the course if necessary. The 1998 evaluation of the latest Swedish curricula indicates that both students and teachers need to be more aware of the processual dimensions of creative work and to reflect upon the 'dispositional' qualities that are involved. The students made progress in terms of visual design, it is true, but they did not improve on those dimensions of creativity that we have summarized under the rubrics of investigative work, inventiveness, ability to use models and capacity for self-assessment.

However, there was one exception. In the very area of the process criteria, students in the final year of the comprehensive school who attended Stockholms Bild och Formklasser (The Stockholm Visual Arts and Craft Classes) completely outdistanced students of the same age in ordinary classes. Some of this difference is probably attributable to the culture of learning that Stockholms Bild och Formklasser offer. 'Children are given the opportunity to get deeply involved in and complete their various projects', and the art and craft teachers, whose classes are half the size of regular classes, 'are in constant dialogue with the students about their work as it evolves' (from teacher interviews). These and other observations have been documented on a video film produced as part of the 1998 evaluation [23]. They substantiate what has been found in research on contexts and dispositions that foster creativity [24], as well as experience from the Arts PROPEL [25] and other attempts to promote creativity.

On the basis of these observations, I propose the following hypotheses about how schools can attain the prescribed target of helping students to develop their creative ability:

Investigative work: fostered if students are given assignments that extend over a significant period of time and address central themes in the domain.

The proliferation of subject matter and materials that schools are supposed to deal with and offer

causes major problems. In general, it is easier to add new subject matter and extra materials, techniques and teaching materials than to remove something. The underlying assumption appears to be that the more information the school provides and the more activities the students carry out, the better. It is easy to forget that if too much is crowded into the syllabus, teaching breaks down into small segments and knowledge becomes fragmented. Research on the psychology of learning lends support to a motto that the school reformer Theodor Sizer [26] took from the Bauhaus School: 'Less is more'. The concepts, principles and perspectives addressed in schools should be central to a domain of knowledge and skills. They should be exercised in different contexts over an extended period of time to allow the students to understand their interrelationships and implications [27]. In order to further creativity, students should be given enough time to investigate, test and revise, to reflect and speak to peers, and to make critical assessments of their own work.

Inventiveness: fostered if the teacher emphasizes the process as well as the product and provides ample opportunity for research, experimentation, and revision.

Creative people have been characterized as problem-finders, since they often discover new challenges when working on a project [28]. They try out new solutions, often by combining ideas and suggested solutions in unanticipated ways. There is a close association between these distinctive features and what has been mentioned above, since one must get deeply involved with a work over time to discover where the interesting challenges reside, and to find ways of pursuing them. Discovery through mistakes or serendipity requires a 'prepared mind' [29]. Yet mental readiness is not sufficient for a creative leap to take place. To reformulate problems and try new solutions, one also needs a certain degree of courage and a willingness to take risks. Experiments and risk-taking do not

always bring successful results. Experiments that always succeed involve no risk; they teach us nothing that we did not know already. If a student is to be adventurous and willing to take risks, the teacher must show appreciation and approval of her courage to take further something she did not already know or master, even if the outcome is not always the intended one.

The ability to use models: fostered if students are encouraged to integrate production with perception and reflection.

Without exception, studies of creativity show the importance of other people's works and ways of thinking [30]. Creativity is not as private and individual a process as we often imagine. It is always part of a social and cultural context. Looking for models to emulate, and finding links between them and one's own work, is a highly active and complex process. This type of cultural influence should not be counteracted in school, as often used to be the case. On the contrary, it should be encouraged and appreciated, since the conditions for creative work are considerably improved if the student constantly intersperses her own work with observations of other people's works, and reflection upon what can be learned from them. Making active use of models means choosing what corresponds to one's own intentions and making something of one's own from it. One borrows what is useful from one or more works that have captured one's interest. This interaction between the student's pictures and those of other people is facilitated if pictures are discussed in class, if the students have ample access to pictures of various kinds, and if they get help in finding the cultural resources they need.

Capacity for self-assessment: fostered if the students are given many opportunities to assess their own performance and to get feedback from peers and teachers; the most informative feedback originates from explicit criteria that tap the important keys to good performance.

The creative work of students, if taken seriously, can and must be assessed and evaluated. Refusal to assess student work is a concession to those who maintain that no learning is taking place. If we accept the assumption that visual design is related to thinking and learning, and that students can develop their ability to appreciate aesthetic qualities, then it is also important to establish what they have learned. A teacher who fails to assess what the students do cannot decide whether or not she is contributing to or impeding their progress. If everything, however trivial it may be, receives the response, 'That's good. Would you like to tell me something about it?' then the student probably will conclude that what she is doing is not particularly important. In his classic paper on *myths* in art education, Elliot Eisner [31] maintained that children respect considered assessments and criticism, because they indicate that the teacher cares for them and is paying attention to their work.

In Arts PROPEL, it is not simply the finished product that is assessed, but consideration is given to the work process and the students' ability to make more subtle observations and reflect on what they have done in a wider context. Assessment has an important part to play in the learning process. It should not simply be a matter between teacher and student; it is at least as important that students are given the opportunity to assess what they themselves and their peers achieve. Criteria and scoring rubrics can serve to focus students' attention on qualities of performance that are otherwise easily neglected; they give them instruments with which to reflect on and communicate about their learning.

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