

Entwining Psychology and Visual Arts: A Classroom Experience

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The purpose of this paper is to show how activating perception, imagery and creativity facilitate the mastery of specific skills of visual arts education. Specifically, the study aimed at answering two questions: How can teachers enhance visual and creative expression?; and What criteria should be used to evaluate specific learning of visual arts skills? Based on a literature review on visual language two specific exercises were devised: one concerning the elaboration and meaning attribution of an image and the other the illustration of a concept. The two exercises were applied to 100 13-year-old students of a rural community in Portugal. The exercises were evaluated in terms of fluency, flexibility, originality, elaboration, expressiveness and adequateness. The results reveal statistically significant differences in these dimensions after the completion of second exercise, revealing that it is possible to use elements of the visual code to express ideas in creative ways.

Keywords: creativity, perception, imagery, visual language

Introduction

Arts education is considered as a basic educational right essential for the development of awareness of various forms of aesthetic expression (Lei de Bases do Sistema Educativo, 2005). However, society has frequently been accused of not recognizing the relevance of arts education (Rolling, 2008). Arts education is, therefore, often seen as frivolous, inconsequential and de-contextualized from other disciplines, reducing the opportunities for its development (Eisner, 2002).

In Portugal, art disciplines are structured around four general competencies: the appropriation of elementary artistic languages, the development of self-expression and communication, the development of creativity and a contextualized understanding of arts (Ministério da Educação, 2001). The visual education curricula have three main objectives. The first—fruition/contemplation—aims at developing specific skills that allow the recognition of the value of the visual arts and the identification of its different forms in historical and socio-cultural national and international contexts. The second—production/creation—pertains to the use of different means of representations and plastic constructions including technologies as well as the interpretation of expressive and communicative meanings taking into account the processes behind their creation. The last principle—reflection/interpretation—concerns creativity, integration of new knowledge and aesthetic development (Ministério da Educação, 2001).

Universally, arts education allows the internalization of a series of “habits”, such as observation, visualization, innovation and thinking that may be transferred to other fields of knowledge (Hetland & Winner, 2008). Moreover, the development of visual language and skills is a crucial developmental tool (Eisner, 2002).

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As Eisner (2008) stressed that education has yet much to learn with arts education. Thus, empowering arts education becomes an important social and cultural mission. Maximizing the potential of arts education includes grounding its specificities into theoretical frames of reference, namely within educational psychology theories. In this sense, the contribution of these theories to education is always needed not only because knowledge on learning and development is continuously being deepened, but also because education is incessantly suffering new challenges (Woolfolk, 2011). More specifically, according to a developmental perspective, the acquisition of artistic skills depends on the development of basic psychological processes, such as perception, imagery, mental operations and creative thinking, and ultimately, of the internalization of the visual code.

Visual Language

Visual arts education is strongly influenced by the Gestalt and the Bauhaus schools (Arnheim, 1954). Its object is visual language, which entails constructs, such as perception, imagery, visualization, abstraction and visual thinking, all of which largely studied and experimented by these schools. Initiated in 1910 by Wertheimer, Gestalt theory argued that any image is decomposed into different parts that are then organized according to a series of laws that specify the dimensions through which the forms vary, creating a new reorganization and a new understanding of its meaning (Koffka, 1935). The Gestalt principles influenced the Bauhaus School, founded by Walter Gropius in 1919. This school was dedicated to artistic training through the work with different materials, colours and textures, the study of pictorial works and the free stimulation of creativity (Gropius, 1923; 2003). One of the Gestalt inheritances has been the constructivist approach to perception.

Perception is seen as ascending or descending internal process that transforms information into precise and detailed wholes, through the interaction between sensory input, internal expectations and knowledge, as well as motivational and emotional factors (Bruner, 1967; Gregory, 1978). Images serve as a broad-spectrum scheme that assimilates a wide range of perceptions, actions and ideas (Gruber, 1981). In this sense, the perception of the whole allows the understanding, decoding and assimilation of images and therefore apprehending, reconstructing and knowing the world thorough dynamic gestalts (Löwgren & Stolterman, 2005). Visual thinking is organized directly from the perception of images, which may be static or transformational (Piaget & Inhelder, 1966). Perception may also arise from the formation of images that are not accessible to the senses. This process implies imagination and visualization, and enables the creation of new ideas based on the combination of previously unrelated ones (Cornelius & Casler, 1991) and determines their relevance in the learning process (Pascual-Leone, Grafman, & Hallet, 1995). This capacity for imagery responsiveness in the absence of a stimulus is an indicator of the capacity for abstract thought (Gregory, 1978). In this sense, image may be reproductive or anticipatory depending on if what is represented was observed or imagined (Bovet & Voelin, 2007). Visualising is the process of representing information with the intent of recognizing, communicating and interpreting patterns and structures (Buttenfield & Mackaness, 1991). In turn, abstraction is the mental representation of objects or events that do not have a concrete reality (Mercer, 2002).

Perception, visualization and abstraction processes are fundamental for structuring thought (Paivio, 1986). Piaget and Inhelder (1966) saw image as an auxiliary of thought. However, more than a “mere” auxiliary that structures thought that image is increasingly recognized as a crucial tool for the development of reasoning, mental transformations and their coordination (Bovet & Voelin, 2007). Some authors consider the existence of

a self-organizing circle responsible for the representations of static and moving images and spatial operations (Shepard & Cooper, 1982). Accordingly, visual thinking is a specialized skill responsible for the use of images and visual relationships used in problem-solving, understanding maths and speed processing (Carroll, 1993). Therefore, perception, visualization and abstraction are important aspects of the mental processes of reasoning in new situations (Primi, 2002). They are used for making inferences, reading between the lines and completing unperceived information through known patterns or new patterns based on the information supplied by the senses (Primi, 2002). The deduction or induction of patterns from this partial information allows the anticipation and assignment of meaning to what we see, hear, read or feel (Sternberg, 1977). Consequently, image helps the integration of information into a whole and allows relating knowledge and understanding phenomena in a unique way that motivates innovation and facilitates creative processes and the creation of new models and metaphors (Paivio, 1971). Due to its relevance, image provides knowledge and its transfer to different domains through the processes of observation, visualization, innovation and reflection (Hetland & Winner, 2008).

Mental imagery uses many of the strategies involved in perception (Kosslyn, Ganis, & Thompson, 2001). The conscious or unconscious production of perceived or imagined images never stops (Damásio, 1999). We depend on images to integrate information, associate knowledge and be innovative and creative (Paivio, 1971). Images may be visual, auditory, kinaesthetic or olfactory. However, two-thirds of mental images are visual (Kosslyn, 1990). For some authors, sight has been considered to be the most intellectual of the senses due to its proximity to thought (Arnheim, 1990). A mental image may be a quasi-perceptual conscious experience, an imagery mental representation or an internal representation that originates a conscious perceptual experience (Thomas, 1999). Mental images are global (Rohrer, 2007) and the divergences concerning their theoretical constructs that are situated in terms of the storage, manipulation and translation of visual stimuli into a specific language (Zeki, 1999). The model of analog processing defends an isomorphism between the object and its superficial, quasi-pictorial and deep representation (Kosslyn, 1990), while the propositional theory advocates an abstract representation (Pylyshyn, 1984). The analog and propositional models are associated to two distinct modes of representation. Analog representation is relatively independent from development and enables the anticipation of the outcome of a transformation without using explicit logic. The propositional representation decomposes the moments of the transformation and recomposes them through logical operations (Dean, Scherzer, & Chabaud, 1986). Nonetheless, imagery is not an isolated ability but a set of abilities enabling visual images to be constructed through the activation of various parts of information (Kosslyn, 1990).

Image formation results from a specific visual language (Archer, 1979). According to Aumont (1990), visual language intervenes in visual thinking. This kind of language provides a comprehensive analysis of the observed reality and the representation of ideas (Dondis, 1991). The acquisition of this code implies a simplification of reality that facilitates the understanding of knowledge as a whole as well as its functional expression (Lupton & Miller, 1991) and acts as a filter of understanding reality (Eisner, 2002). The internalization of the structural elements of visual language (e.g., point, line, texture, colour and value, form, scale, movement and rhythm, plane, and volume and space) provides the apprehension and communication of this specific language. The Bauhaus School developed the concepts of visual grammar elements in particular the composition of the three basic forms and primary colours (Lupton & Miller, 1991), which form the base of visual arts education.

Arts Education

Despite of the increasing knowledge about the importance of image and visual thinking, we still tend to overlook its magnitude in educational terms. Arnheim (1990) considered that the five senses have been socially neglected and that we lack the capacity to express ideas through images and find meaning in what we see. A consequence of the lack of opportunity for the manipulation of images is the lack of access to abstraction in adolescence (Bryant, 1985; Sutherland, 1992). Research has found that many adults are not able to use abstract thought and tend to use a concrete operational structure in many circumstances, restricting themselves to the immediate, observable and direct and assuming the existence of only one possible solution rather than a multiplicity of solutions, interpretations and ways of resolution of problems (Cowan, 1978). The use of concrete rather than abstract operations is also reflected in the lack of awareness of error and in the difficulty in consistently applying rules and seeing the uncertainty of a solution (Lieberman, 1970).

Because arts education facilitates the development of abstraction, it is crucial to human development (Arnheim, 1990; Eisner, 2002). However, arts education is not always a facilitator of visual thinking, and in some cases, it may be an inhibitor (Anning, 2003). Matthews (2003) accused the arts education of not giving the student time to experiment and communicate. This trend is exacerbated by the failure to recognize the relevance of art in the family, social and school curricula (Rolling, 2008). As Eisner (2002) alerted, arts education is often seen as frivolous, inconsequential and taught in separate from other disciplines, reducing the opportunities for development.

Observation, visualization, innovation and reflection enhance the development of knowledge (Hetland & Winner, 2008). Images are at the core of visual education and allow the combination of previously unrelated ideas (Cornelius & Casler, 1991) and structured thinking (Paivio, 1986) and facilitate learning in other domains (Pascual-Leone, Grafman, & Hallet, 1995) and creative production (Eisner, 2002). Moreover, the development of visual skills benefits imagery, the manipulation of mental representations, abstraction and creativity, because it enables adolescents to create a symbolic world (Hurwitz & Day, 1995).

Although creativity is difficult to define, it is consensual that it implies the ability to produce something new, with value for the individual and for others (Pope, 2005). Creativity is multidimensional and results from the confluence of fluency, flexibility, originality, expressiveness and appropriateness (Torrance, 1988). Creative thinking is an important component of problem-solving and cognitive abilities, social and emotional well-being and success, and in this sense, the construct of creativity has a great deal to offer to education and educational psychology (Plucker, Beghetto, & Dow, 2004). In sum, stimulating the basic processes that help the understanding and expression of images and of creativity is a fundamental tool for education in general and art education in particular.

Taking into account these theoretical concepts, the present study intended to promote visual thinking in a group of adolescent students. Specifically, the study aimed at determining how the application of a strategy that allowed the formation of images, the assignment of meaning and the illustration of a concept was effective in promoting the use of the elements of the visual language.

Method

This research study stemmed from the need to deepen the knowledge of teaching strategies that facilitate the appropriation of visual language, expression, communication and creativity which characterize visual arts.

More explicitly, the study's objective was to show how activating perception, imagery and creativity facilitate the mastery of specific skills of visual arts education. The first research question posed was formulated as follows: How can teachers enhance visual and creative expression? Implication in the conception and application of any educational strategy is the evaluation of its effectiveness. Therefore, a second research question was also formulated: What criteria should be used to evaluate specific learning of visual arts skills?

The strategy that was conceived and implemented was based on the belief that the construction of a visual knowledge is grounded on a dynamic inter-action between knowledge and motivational and emotional factors (Bruner, 1967; Gregory, 1978). The appropriation of a visual language enables a comprehensive reading of reality (Eisner, 2002), representation of ideas (Dondis, 1991) and concept formation (Löwgren & Stolterman, 2005). This strategy consisted in two specific exercises inspired by the visual grammar which was explored by Bauhaus and adapted to the current knowledge about visual language and thinking. The conception of exercises had its foundation in the concepts of internalization, understanding and expression of the elements of the visual language and intended to promote them. Both exercises trained the elaboration and meaning attribution of an image composition and were evaluated in terms of fluency, flexibility, originality, elaboration and expressiveness. Their implementation revealed the extent to which these dimensions were understood and used in the communication of ideas, that is, the extent to which they were internalized. The resulting data was analyzed comparing the performance in the first and second exercises.

Participants

This study analyzed the productions of a total of 7th grade 100 students from a school of a rural area in Portugal, from four different, yet equivalent, classes. The mean age of pupils was 13 years and three months and 42 were female and 58 male. The rate of school failure is 15 per 100 students, the same as the national average.

Instruments

Two types of instruments were used: two intervention exercises and an evaluation grid. The intervention consisted of a set of two sequential exercises based on the theoretical frameworks of imagery, meaning attribution, visualization, abstraction and visual communication. The evaluation consisted of the application of a group of specific criteria based on the decomposition and composition of figures and the dimensions of creative products.

More specifically, the strategy to promote the internalization of visual language and thinking occurred in two consecutive phases: the creation of an image and the subsequent assignment of meaning followed by the illustration of a concept. In the first exercise, students had to divide a sheet of paper into six equal portions and draw a combination of nine of the three basic geometrical figures (squares, circles or triangles), varying the frequency of the figures used, the scale, the direction and its occupation of the space. The material was an A4 sheet of paper, charcoal pencils and coloured pencils or pens. The first step applied the Bauhaus principles of visual grammar, the combination of the three basic geometrical figures, and intended to foster the ability to compose forms with no specific expressive or communicational intention and without resorting to the concrete representation of a concept or idea. The second part of this exercise aimed at assigning meaning to each set of combinations formed and writing the title of each composition.

The second exercise started with reading aloud and debating in the classroom three children's rights. The

following step was the composition of an illustration of one, two or three rights using nine of the three basic geometric figures (squares, circles and triangles) in order to communicate the fundamental concept of the right(s) into the six equal parts of the sheet of paper. The first composition had to be drawn, with the same materials of the first exercise. The following compositions, if done, could resource to digital support, namely, using a PowerPoint application. Analogic technologies facilitate a first approach to experimentation, whereas digital technologies give expressiveness to production. While the first exercise called for the random composition of forms and subsequent assignment of meaning to these combinations, the second exercise aimed at developing the ability to communicate an idea, using the elements of the visual code.

In terms of evaluation, the final products of both exercises were analysed in order to capture the extent to which the students were able to use elements of the visual code in communicating ideas. The evaluation criteria aimed at rating the composition of the elements of the visual language and the creativity of the compositions and meaning attribution in terms of: (1) fluency, which refers to the number of relevant ideas; (2) flexibility, which refers to the number of categories or themes that underlie the ideas; (3) originality, defined by statistical infrequency; (4) elaboration, associated with the number of details; expressiveness, focusing on the richness of the image (Torrance, 1966); and (5) also adequacy (Nickerson, Perkins, & Smith, 1985), that is, the possibility of adaptation to reality. In concrete terms, each composition was rated from 1 to 5, where 1 was the total absence and 5 was the full inclusion of the following elements of each criteria:

- (1) Fluency—number of appropriate responses to the given task (the presence of six rectangles, nine figures and variation in terms of the rules—figures used, different directions and scale);
- (2) Flexibility—use of different categories of knowledge to assign meaning or illustrate the concept;
- (3) Originality—infrequency of responses and non-use of stereotypical images;
- (4) Elaboration—richness of the variation of the application of the figures (direction, dynamic and static composition, scale, flexible use of the space and rigor in the construction of ideas);
- (5) Expressiveness—strengthening the code of form that reveals emotional richness;
- (6) Overall assessment—overall assessment of the work taking into account the composition of figures and creativity of the product.

Procedure

The exercises were a part of a specific didactic unit of the discipline of visual education, namely, graphic design that is usually worked in the 7th grade. The first exercise was conducted during two 90-minute classes, while the second exercise lasted three 90 minutes classes. Overall, the students were receptive and engaged in the exercises. However, the first part of the first exercise was accompanied by various comments from students. Some were pleased to be able to carry out a new challenge, commenting that overcoming a problem without a concrete reference was an innovative experience. However, the majority of the students expressed some initial resistance “How can we do something without a specific purpose?”. At the end of the second exercise, these students were pleased, because they had discovered the reason why they had done the first exercise. The second exercise was received with enthusiasm and the students were able to accomplish it without resistance and in an autonomous way.

Results

The evaluation of the efficacy of strategy to promote the use of the visual language consisted of the

comparative analysis of the results of the two exercises in terms of six theoretically based criteria: fluency, flexibility, originality, elaboration, expressiveness and overall assessment. A *t*-test for paired samples was used. There were significant differences in all criteria between the first and second exercises (see Table 1).

Table 1

Differences Between the First and Second Exercise for the Criteria of Fluency, Flexibility, Originality, Elaboration, Expressiveness and Global Appreciation

Criteria	Mean	Standard deviation	<i>t</i>	Degrees of freedom	<i>p</i> -value
Fluency 1	3.43	0.82			
Fluency 2	4.02	0.84	-2.85	99	0.005
Flexibility 1	3.28	0.89			
Flexibility 2	3.67	0.71	-2.43	99	0.017
Originality 1	3.20	0.89			
Originality 2	3.53	0.78	-5.82	99	0.000
Elaboration 1	3.09	0.98			
Elaboration 2	3.70	0.89	-5.25	99	0.000
Expressiveness 1	3.02	0.91			
Expressiveness 2	3.52	0.83	-7.84	99	0.000
Global 1	3.21	0.83			
Global 2	3.62	0.74	-8.08	99	0.000

The differences for fluency, originality, elaboration, expressiveness and overall assessment were significant at $p < 0.01$ ($t_{(99)} = -2.85$, $p < 0.01$, $t_{(99)} = -5.82$, $p < 0.01$, $t_{(99)} = -5.25$, $p < 0.01$, $t_{(99)} = -7.84$, $p < 0.01$, $t_{(99)} = -8.08$, $p < 0.01$, respectively), whereas the differences for flexibility were significant for $p < 0.05$ ($t_{(99)} = -2.43$, $p < 0.05$).

Discussion and Conclusions

The comparative analysis between the first and second exercises revealed significant differences in all the evaluation criteria. These differences were strong ($p < 0.01$), with exception to flexibility ($p < 0.05$), revealing that between both exercises, the 100 students internalized and applied elements of visual language.

The first exercise intended to systematize the process of representation of ideas using visual language (Dondis, 1991) through figure composition and the subsequent recognition, interpretation and communication of its meaning (Buttenfield & Mackaness, 1992). In the first part of this exercise, students were asked to apply visual language without considering the representation of an idea. Composition rules of the grouping of geometric figures were specified, leading some students to express expectations of failure. In spite of this negative expectation, these students and all the others without exception performed the final exercise of the strategy. Experimenting various possible combinations of figures facilitated the creative process through the construction of new models (Paivio, 1971). The exercises also seem to have stimulated the process of propositional representation by decomposing and composing the elements and in a second phase recomposing them through the use of logical operations (Dean et al., 1986). As Cornelius and Casler (1991) claimed, image allows for the creation of new ideas. Analysing the compositions of the first exercise encouraged a reflection on the use of the elements of visual language. The second phase of this exercise trained observational and interpretation skills that had not been requested in the first phase of the exercise and ultimately encouraged the process of discovery of a specific visual code. Thus, this second phase of the first exercise called for the

perception of the whole as well as the decoding and understanding of images formed through a gestalt dynamic, as Löwgren and Stolterman (2005) suggested. Assigning a theme to the combinations promoted a flexible search for solutions (Torrance, 1988).

The second exercise sought to stimulate the simplification of an abstract reality—a human right, and its understanding and expression in a functional way allowing a clear communication of the idea (Lupton & Miller, 1991). The success in this exercise showed the effectiveness of the training of observation, interpretation, use and communication of the visual elements of this code. In terms of creativity, the number of original ideas and expressive details also increased significantly. However, flexibility was not stimulated with the same expression. One explanation is based on the argument that fluency, originality, elaboration and expressiveness are the dimensions of creativity usually evaluated in Torrance's tests for creative thinking (Torrance, 1966), but not flexibility (Kim, 2006) due to its proximity to the fluency of ideas. What may have happened is that the students had more ideas, but did not have enough time to advance with ideas from a wide range of categories. Time is an essential dimension of arts education, as Eisner (2002) referred. Another explanation resides in a difference in the nature of the exercises: The first exercise, while appealing first to the free experimentation of figure composition and then to the attribution of meaning, may have enhanced flexibility more than the second exercise that more restricted, because the number of categories of the composition was constrained to the illustration of three children's rights. Contrary to this expectation, the final products revealed higher flexibility levels. This result seems to point to the efficacy of the applied strategy in spite of the nature of the last exercise not appealing directly to a more flexible thought. Nonetheless, the other dimensions of creativity were clearly stimulated, that is, students were more original, expressive and adequate in the expression of innovative ideas communicated through visual language.

The promotion of strategies that seek to develop the internalization of visual elements also helps to structure visual thinking, in that it is not possible to separate language and visual thinking (Aumont, 1990). The comments of students during and after the exercises showed that they understood the potential variation in the figures. Some students showed a high resistance towards the first exercise but in the end expressed their satisfaction for being able to assign a meaning to their work. Most academic tasks are based on an "a priori" attribution of meaning and that was why students who showed an initial resistance to the first part of the exercise. In this sense, all experiences that appeal to non-routinely procedures potentiate creativity (Torrance, 1988). As Bovet and Voelin (2007) defended, the use of image structures operative reasoning. Consequently, training perception, visualization and abstraction tend to favour the development of mental operations of reasoning in new situations (Primi, 2002) and its transfer to other areas, as suggested by Hetland and Winner (2008).

The structured exercises with the basic geometric figures used in the Bauhaus proved effective in promoting specific visual education skills in a group of adolescent students from a rural community. Mastering this simple code enabled these adolescents to develop a form of universal understanding and formulation of ideas, revealing that an intervention based on concepts of the psychological realm may have a very positive impact on the context of arts education. Ultimately, grounding educational experiences on the theoretical foundations of psychological concepts enhances teaching and learning, allowing the development of multiple forms of literacy at the service of the poetic rather than the literal enabling the recovery and expression of meanings, as Eisner (2008) recently proposed, because the limits of cognition are not defined by the limits of language (Eisner, 2002).

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