A PICTURE IS WORTH A THOUSAND WORDS

VISUAL THINKING BETWEEN CREATIVE THINKING AND CRITICAL THINKING IN THE TEACHING-LEARNING PROCESSES

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VISUAL THINKING
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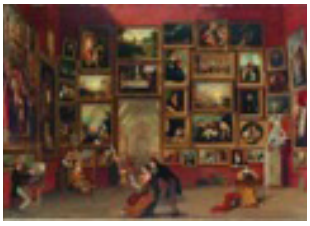
Although contemporary society has a predominantly visual character, education still privileges the written word over all other forms of communication and subordinates the visual text to that written in understanding. In fact, teachers are not always well prepared to analyze the visual language and to discuss its meanings, while working on precise goals and curricular contents, relying mainly on verbal and printed language. Indeed, effective communication extends beyond the ability to use verbal language to include communication through visual arts and expressive movement, which highlights the value assumed by the use of visual thinking in the use of media and technologies to convey messages and the importance of understanding how to judge their effectiveness, as well as assess their impact.

1. VISUAL THINKING AND MULTIMODALITY TEXTS

How can visual thinking be relevant in the training of teachers in all disciplines? Although contemporary society has a predominantly visual character, education still privileges the written word over all other forms of communication and subordinates the visual text to that written in understanding. Children, teens and adults today interact with thousands of moving and fixed images as they navigate their school and extracurricular lives.

All these visual experiences take advantage of the strengths of the various communication and semiotic systems by helping to create learning environments in which language skills do not define the limits of cognition (Eisner, 2002, p. 12). So much so that particular benefits can derive from the use of different and multiple approaches (Barwise & Etchemendy, 1992; Schnotz, 2001; 2002; Mayer, 1997) to particular problems (Ainsworth et al., 2002), in since a multi-representative system can contain representations of different computational properties (eg heterogeneous systems, multimodal systems, multidimensional systems) and can affect students' objectives, decisions and strategies by influencing their use of representation (Schnotz & Bannert, 2003).



Multiple representations can offer unique advantages when people learn complex ideas (Ainsworth, 2006). The complexity of the relations between the various meanings or semiotic systems in a text increases proportionally to the number of ways and methods technically involved to make it happen. The different multimodal modes are creatively integrated in various ways to give rise to configurations to consistently convey the required meaning, shifting the emphasis back and forth between the various modes (Cope & Kalantzis, 2009, p. 423). For example, a text from a film is a complex multimodal text that dynamically combines the semiotic systems of the moving image, audio, spoken language, written language, space and gesture to convey meanings. However, teachers are not always well prepared

to analyze the visual language and to discuss its meanings, while working on precise goals and curricular contents, relying mainly on verbal and printed language; which suggests that they need in their professional development (Britsch, 2013; Cloonan, 2011) to permeate this dimension with visual ability, not in a cumulative sense, since such skills are considered important both to support verbal abilities ones and to address new forms languages that the knowledge society requires to be acquired.

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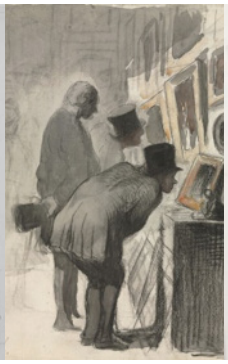
Multimedia research has now shown how visual information helps to increase understanding of textual information (Mayer, 2009, p. 223) and that people learn better from images rather than from only words, that is, words and images enhancing each other. Texts and images constitute different symbol systems with specific characteristics; the former are characterized as descriptive symbolic representations, while the latter as iconic representational representations, which makes both of them situated in different types of context, for different kinds of information, complementing each other.



The research results also indicate that the relationship between the visual and verbal areas of students' creative thinking is statistically significant and that the structure of their creative thinking is at the beginning of holistic puberty and has a flexible character with respect to the relationship between visual areas and verbal. They suggest that visual and verbal materials can be used as stimuli through specific techniques, including narrative ones, for the effective development of students' creative thinking. But there remains the problem of how the visual can succeed in encouraging learning of any kind and creativity and under what conditions. The development of creative thinking begins in the early years of life (Butler, Gott, & Quinsenberry, 1975) and starts with imagination, which leads to expressive forms and other creative activities (Piaget & Inhelder, 1966) and to the existence of "front images" that come into play in the provisional graphic of the child before he actually draws.

The transformation of the mental image into a physical picture is observed between the ages of 3 and 6 (Piaget & Inhelder, 1966), when the mental image is transposed into a graphic copy, which can be the representation of the thing as an idea used by the individual to express himself. Indeed, for Piaget and Inhelder (1966), the pictorial representation of movements is possible only when the mental image is supported by the operations of thought, that is, not before 7 or 8 years.

They consider that pictorial representations are static, that they are incapable of figuring the movement. They are centered on states and not on transformations which connect the states to each other. It is only at 7-8 years of age that the mobility of the child's thinking allows him to mentally represent actions on symbolic objects, because the operational thinking is the framework in which the transformations or movements can be represented. In this theory which sees in action the origin of imagined thought, Piaget and Inhelder (1956; 1966) observed that the construction of a mental image can resemble the construction of a pictorial image. But

in reality, imagination, as the basis of all creative activity, is an important component of all aspects of cultural life, allowing artistic, scientific and technical creation alike. In this sense, everything that surrounds us was created by the hand of man, from the whole world of the human. Therefore, for example, the order to perform transformations to mentally construct a practice solution (geometric, pictorial etc.) may reflect the order in which they are you need different types of information about an object to efficiently plan and execute a drawing of that object.

It is in this direction that Torrance (1979a; 1979b; Torrance, Ball, & Safter, 1992) emphasized that imagination is continuous and relates to the explanation of the development of creative thinking, where visual skills play an application and interpretation role for the development of potential visual messages. He (1966, p. 6) defined creativity as a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on, identifying the difficulty, searching for solutions, making guesses, or formulating hypotheses about the deficiencies, testing and retesting these hypotheses and possibly modifying and retesting them, and finally communicating the results. The great potential of creative thinking, for this scholar, originates from visual experience and from the possession of precise skills that he operationalized (1966; 1975).

2. VISUAL THINKING, CREATIVE THINKING AND CRITICAL THINKING: WHAT RELATIONSHIP IN TEACHING-LEARNING PROCESSES?

Visual thinking is generally considered as a style of thinking that involves all domains and all visual disciplines, presenting itself as complementary to critical thinking and to creative thinking and to other types of thinking, visual and non-visual. It implies the ability to manage visual information, which has also evolved in response to the emergence

of new media, presupposing new forms of internalization of visuo-manipulative, immersive and movement activities in the environment. Visual thinking involves, for example, the locomotion imagined in imaginary settings, the imagined manipulation of imagined and real objects, but also not present, etc. However, it can be stated that, in addition to strengthening teachers' communication skills, it generates critical thinking skills, including creativity.

The intersection between creativity and critical thinking is the heart of visual thinking. Where creativity involves the ability to explore patterns, shapes, textures and colours through visual means, critical thinking involves examining clues, considering alternatives while exploring different possibilities.

Creative thinking and critical thinking are closely related to the visual dimension as they are related to the capacity for initiative, problem solving, risk assessment, decision-making and constructive project management skills.

These are all skills that play an important role in alphabetic processes and are related to each other. The fundamental competences related to language, reading, writing and calculation and information and communication technologies are cornerstones for learning, where the visual represents the fulcrum for their functioning and where higher order skills supervise the ability to learn to learn as a useful tool for all learning tasks and teaching activities.

However, visual thinking is often poorly understood in curricular behaviors and it is important to find ways to know more deeply its nature and the role it plays within training at all levels, also with reference to creative and critical thinking.

The latter involves continuous discernment through the development of meaningful processes; and it is in this that it becomes an ally of creative thought, which is typically described as an admirable quality or as an unexpected and original way of "finding" solutions or "happening" in situations rather than a fundamental human ability to create meanings.

Thus, too often, the critical-creative form of students' questions ends up being hindered and even denied, if there is no room for its understanding.

In this sense, visual thinking takes on the function of mediation, implementing a powerful synergy between critical and creative thinking and producing powerful learning capable of supporting the understanding of messages and the processes of deep reading of texts. The credibility of the visual message thus becomes central in the training of teachers to develop the sense of visual logic in teaching, which can be called a vital skill to critically evaluate the real meaning of the visual message, which requires students to "decode" carefully the text to be able to make logical inferences and adopt specific visual evidences during the "reading" of the images. Consequently, a profound visual reading involves the adoption of precise abilities that remain at the center of understanding and enjoying complex messages and visual works. The research so far has consistently described the reading of complex visual texts even when the processes differ (Boyles, 2012; Brown & Kappes, 2012; Fisher & Frey, 2012; 2013; 2014; Hinchman & Moore, 2013).

Visual abilities, relating to the creative and critical ones, while based on different constructs for differentiating the outcome of human behaviour, show how people should face everyday problems using all three. Therefore, visual skills, useful tools for the development of creativity and critical thinking skills, are profitably inserted in a teaching-learning context based on problem solving in a didactic design perspective capable of integrating visual, audio and gestural aspects, the spatial and tactile meanings within multimodal and non-limited texts of printed and verbal language, indeed using them finely as a metalanguage for teachers and students to be used for discussion.

The main aspect of this interpretation is therefore not to teach reading and writing images but to use them critically and creatively to solve problems (Rhodes, 1961; Runco, 2014a; 2014b; Schiou, 2014).

Creativity involves communication and self-expression and can express itself using a variety of methods (language, visual and movement) to convey meaning and adapt effectively to a variety of circumstances. In this the reading and writing of, with and through images configure itself as qualified capacities (Segal, Chipman, & Glaser, 1985) and as scientific and technological alphabetic tools (Lawless & Brown, 2015) indispensable in education. It follows that these skills should be reflected in teacher and student training programs to implement even the weakest cognitive skills.

In the learning process it is possible to state that individuals have to face many real-life problems and the main objective of image literacy can only be to guide them to become expert users, users and producers of visual texts. Often the meaning of thinking with and through images is not considered an objective neither of teaching nor of learning, and this implies that the questions to be answered that require the use of this kind of thought are very difficult to fulfill. In today's society, increasing students' ability to solve problems using visual and creative thinking is not considered a goal of education, unlike what happens with the critical one (Paul & Elder, 2008; 2009; 2012a; 2012b). Visual learning is directly associated with critical thinking and indirectly with verbal thinking and communication and can even sometimes be considered a result of the latter. Thus, this kind of thinking serves, in some cases, as a compensatory tool for knowledge, abilities, processes and attitudes (Lai, 2011).

Creative thinking can be defined as a series of cognitive activities used by individuals based on a specific object, specific problem and condition or as a type of effort towards a particular event, fact or problem based on specific abilities, that induces individuals to try to use their imagination, intelligence, intuition and their ideas when they face situations of different kinds.

This suggests the use of an authentic and new design, capable of generating new different design hypotheses that lead to solving problems with the discovery of new applica-

tions and solutions (Young & Balli, 2014) in which each individual is able to recognize the its cognitive limits and is activated to fill these gaps while obtaining new visual points of view.

There are few empirical studies that have explored the reading and use of multimodal or visual (Dalton, 2013) or disciplinary texts (Fang & Pace, 2013) and the relationships they have with the development of visual thinking. As the multisign texts with a high information level continue to evolve, the research contributions become increasingly important for development of the literacy, disciplinary and interdisciplinary, as well as to support multimodal reading and writing by students and teachers. For this reason the acquisition of a visual thought becomes an analytical commitment for the comprehension of complex texts and whose close reading requires repeated readings in which the students not only use it but give proof of its use.

It is in this sense that pictures and visual thinking can provide teachers with access to strategic resources, helping to make the students reach even complex goals, and exploiting students' visual knowledge to increase their understanding of reality. If this is true it is necessary that teachers support the kind of skills connected to them and those methodological skills that help them to use them to the fullest. It is a question here of supporting an interpretative approach centered on the active participation of the student, creator of knowledge, who, starting from his personal and social background, is able to construct a visual thought closely linked to observation skills, to the analytical reading of the visual text (Yenawine, 2013) and to reality. This may include the use of heuristic and creative strategies to adequately use different cultural resources such as museums, for example, and to increase the forms of aesthetic knowledge designed to encourage an internalized understanding (Nuzzaci, 2012b).

Research has shown the positive impact that the construction of visual thinking has on learning both in young people and adults. Studies have revealed that, being quite

flexible, it is effective for improving writing (Franco & Unrath, 2014; Moeller et al., 2013), critical thinking (Landorf, 2006a; Moeller et al., 2013, Yenawine & Miller, 2014), encouraging risk-taking (Franco & Unrath, 2014; Landorf, 2006b), supporting acquisitions in a wide range of disciplines and facilitating relations between different content areas (Hailey, 2014) because it supports strategic thinking and the possibilities of thinking in various ways (Yenawine & Miller, 2014, p. 3). Despite this growing body of research, however, it would be necessary to broaden the empirical studies related to the effects that the construction of a visual thought in teachers determines on the quality of teaching.

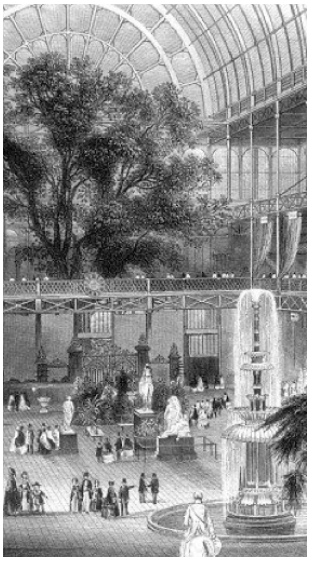
There is little research on how teachers use the visual in disciplinary literacy and multiliteracies processes at all levels of education (Nuzzaci, 2012a), how they perceive the advantages and disadvantages of using images for a careful reading of informational texts at Within specific disciplinary areas, how they employ and analyse a wide range of print texts and not printed in old media forms and new. Little or nothing is known about how the visual experience supports the curricular objectives of basic skills. Images, as decisive didactic supports, facilitating understanding when working with increasingly complex text requests and asking for inferences about visual and non-visual texts, but they are not considered simple outfits. The visual tools also involve critical thinking, which serves to reason effectively both inductively and deductively, to use systems to analyse the interactions of parts as a whole, to make decisions that include the examination of evidence, the analysis by several points of view, to synthesize and make connections between information, drawing conclusions and critically reflecting on experiences, solving problems by examining problems in familiar and innovative ways by developing meaningful questions to find better solutions.

Critical thinking and visual thinking combine in linking materials, previously learned personal experiences and new experiences. In fact, it includes various activities of a multi-

faceted nature (Lawson, 2006). In fact, different disciplines or visual programs implement visual thinking in a variety of forms (Meinel & Leifer, 2010). Variations of visual thinking styles have been reported in many empirical studies (Akin, 2001; Purcell & Gero, 1996), explaining how the visual thinking helps organize thoughts and improve the ability to think and communicate, as a good way of thinking visually, for example, uses the spatial relationship between objects on the page to store information.

Ability to think visually around revolves the awareness of teaching how levels of meaning interact. In its multiple forms (from technical or cartographic representation, to photography or video, to design or illustration, to the fine arts) it can lead to teaching tacit and "felt" knowledge, creative experiences and links from analysis to synthesis (Archer et al., 2005; Cross, 2008; Owen, 2006). Some visual thinking skills are increasingly fundamental and basic in media education and are becoming more important as the use of digital images increases.

3. VISUAL THINKING AND MEDIA EDUCATION



The research has estimated that the time spent by students in front of the screen in recent years has doubled (Wartella et al., 2013; Lauricella et al., 2015), confirming how the transition from the printed text to the multimodal one, which combines words, images and sounds, requires a different approach to training by teachers and students (Nuzzaci, 2011; 2012a). While it is true that students' exposure to different media sources does not imply that they know how to critically examine all the images presented to them, it is equally true that it is up to teachers to support students in this burdensome task.

Visual texts should be exploited in schools to support a range of literacy goals and be an integral part of teaching strategies and the communication process in education. In

this sense, the visual training of teachers appears to be decisive in order to be able to ensure that the school is able to seize the opportunities that multi-perspective and multi-view and multimodal texts offer to teaching-learning processes and to make them become real chances in the practice of alphabets.

Visual thinking becomes a powerful cognitive tool in school (Rieber, 1995). In everyday school life, solving problems and spatial reasoning is essential as it allows people to use concrete means to deal with abstract images. However, the world of teaching has fluctuated variously between periods when visualization was considered important in pedagogy or was seen as an obstacle. The pictorial and visual forms of representation can offer advantages over textual resources by offering opportunities to show spatial interrelations, demonstrate proportional relationships within and between objects and facilitate perceptual inference. Furthermore, visualization has achieved tremendous success in helping teachers understand and present their teaching. Indeed, it has been observed that visual forms of representation are important, not only as heuristics and pedagogical tools, but as legitimate aspects of reasoning and learning. Technologies can offer visual experiences favoring higher order cognition as critical thinking and reflective thinking. Students should be encouraged to use multiple modes of representation when learning with ICT.

Recognizing the fact that these visual and media tools are changing learning and teaching design behaviors, influencing education processes, many studies have paid attention to the impact of new media on visual thinking and vice versa. For example, the idea of coordinating computer-aided design and drawing up design plans to facilitate the application of new processes, strategies and techniques. Many studies have paid attention to the impact of digital media on visual thinking, which has been implemented in many programs and curricula with the aim of educating to the visual (Meinel & Leifer, 2010; Oxman, 1999), in order to use focused meth-

odologies on man, supporting abductive thinking (Dorst, 2006; 2010; Lockwood, 2010) and taking a multidisciplinary attitude (Meinel & Leifer, 2010) towards knowledge etc. The new media feed visual thinking by making multilingual competences interact with images, developing invisible messages of deeper meaning, encouraging flexibility and increasing the memorization and recovery of mental and real images, reusing existing ones to communicate effectively.

Indispensable for understanding and effectively utilizing the full potential of critical thinking, such skills can be taught using any media. In particular, digital images can be manipulated and test our traditional sense of visual reality; they are stored as discrete fragments of contextless and available information for flexible manipulation, cloning or combining images in new interlocutory relationships. The term visualization is familiar to us from the common use and basically means "to form and manipulate a mental image". This is a "technically assisted alteration", which has therefore made visual literacy and the digital potential for image modification more problematics from the point of view of the alteration of external reality. With digital images, what you do visually is immediately editable.


EXPOSITION DE PEINTURE EN 1852.
M. Courbet ayant fait école, on ne trouvera en 1852, en fait de peintures, rien que des tableaux représentant des paysans.

The human motivation for producing pictures that attracts attention and forces effective communication has always been a necessity present in teacher education. At school, with graphic design in any media, digital or otherwise, a difficulty arises in being both the observer and the active creator of the thing observed. In the digital age the teacher has anyway the advantage of increasing a teaching in which it is necessary to make design decisions.

Only by participating deeply in an interactive process and accepting it completely, the teacher creates new combinations of existing educational ideas with a deeper series of meanings. As long as an experience is truly meaningful, students will have to be able to interact with new digital media not as "passive consumers"; and to do so, quality education will be required to develop visual thinking skills necessary to

manage typical aspects of the new digital environment and to adopt a multidisciplinary attitude (Meinel & Leifer, 2010).

Several studies have shown that media education pathways can have a strong influence on how to shape students' thinking styles and their preferred visual strategies. The multiple media forms (from technical or cartographic representation, to photography or video, to design or illustration, to fine arts) can bring tacit and "felt" knowledge and creative experiences and links from analysis to synthesis (Archer et al., 2005; Cross, 2008a; Owen, 2006). Durling et al. (1996) indicated a certain type intuitive way of reasoning, and Lawson (2006) instead explicitly argued that such preferences, in terms of cognitive strategies, are learned behaviours. It is in this sense that it becomes interesting to evaluate the impacts of different visual disciplines on students' visual, creative and critical thinking models, as well as the implications on multimodal and multidisciplinary approaches to learning. Does the promotion of visual thinking create a common and favourable ground for interdisciplinary visual collaborations? Can the variety of curricula focused on visual thinking give shape to different visual interpretations?

In this sense, the visual thinking can be said to be linked to abductive reasoning, that is, the reasoning with which explanatory hypotheses are formed and evaluated. However, adequate formalization should take into account the fact that the explanation is not deduction and that hypotheses sometimes stratify and can be revolutionary; and abductive reasoning can be visual and non-sentenced. Understanding how visual aspects affect hypothesis formation can help to understand the question of visual inference and that of connection with the evaluation of explanatory hypotheses, which can be effectively taught through spatial thought and analysis with the use of technology, as in the case of visualization of maps and images, and can lead to a creative resolution of doubt and to the development of a new and personally significant understanding. The visual abilities thus include various activities of a multifaceted nature (Lawson, 2006),

different disciplines and programs linked to the variety of forms of visual thinking (Meinel & Leifer, 2010). Mediality and variations of thinking styles have been treated in many empirical studies (Akin, 2001; Purcell & Gero, 1996). However, how these disciplinary variations of visual thinking can influence visual experiences of different origins is, in any case, little explored area.

A positive way of "thinking visually" thus becomes a positive way of "medially thinking", while also leveraging the spatial relationship between virtual and object objects to preserve information. The ability to think visually therefore revolves around the awareness of being able to make all the levels of meaning and the sign systems interact. This also supports the creative process, which is also represented by a special form of reasoning called abductive reasoning, which in turn can lead to a creative resolution of the doubt and to the development of a new and personally significant understanding. So if we thought of school as a place where doubts must be able to flourish and creative processes in students can be encouraged, then the cultivation of visual thought would only point out in all its strength the tangible value of the expression "a picture is worth a thousand words".

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