Do creativity and university intertwine?

Sara Bahia
sarabahia@fpce.ul.pt
Faculty of Psychology and Educational Sciences of the University of Lisbon

Abstract:
The development of creative potential is one of the goals of educational intervention in several contexts, including in higher education. The ability to innovate and critically analyse constitute essential aims at this teaching level. To what extent are these goals achieved? What are the specific concerns that higher education teachers should take into account in pursuing these goals? To answer these questions the creativity indices of 262 higher education students collected in 3 research studies were analysed. Based on the discussion of the results, some ideas are given as to how to stimulate the full development of the creative potential of university students.

Key words:
Creativity, Flexibility, Innovation, Critical thinking.

Bahia, Sara (2008). Do creativity and university intertwine?
Sísifo. Educational Sciences Journal, 07, pp. 49-60.
Retrieved [month, year] from http://sisifo.fpce.ul.pt

INTRODUCTION

Development of the ability to innovate and critically analyse constitutes an overriding aim of university education[1]. Innovation describes a process that involves the application of the creative process to a product considered creative. The "new" problem is an epistemological concern, borne out in the work of Piaget, who says that to understand is to invent (Piaget, 1972), in other words, to create. However, ascertaining precisely what constitutes an innovation goes beyond the personal sphere and involves the context of creative production. The systematic approach (Csikszentmihalyi, 1988) therefore considers innovative and creative production the result of the person (the biological and the experience), the domain (area of knowledge) and the field (specialists from a specific area that have the power to determine the structure of the domain and judge whether a product is creative).

In turn, critical analysis is the result of a personal process linked to critical thinking, considered the opposite to reproductive and fragmented thinking (e.g. Ennis, 1989). Traditional conceptions of critical thinking point towards logic, i.e. towards convergent thinking, highlighting its logical, significant, disciplined and self-guided nature (Paul, 1992). In Boisvert's view (1999), critical thinkers in the "strong" sense of the term present seven independent traits, applicable to any domain of knowledge: intellectual humility, courage, empathy, integrity, perseverance, faith in reason and intellectual sense of justice. However, critical thinking involves other dimensions that go beyond logical processes, such as the production of original ideas and thought (Jonassen, 1996), intuition, imagination, creativity and analysis of thought processes to improve understanding (Litecky, 1992). Along these lines, Lipman (1991) argues that critical thinking and creative thinking are interlinked, leading to complex thinking.

To sum up, a broad perspective of creativity is found in the essence of processes that lead to an innovative and critical attitude in relation to knowledge. Creativity is a human capacity that enables the perception of a problem and generation of new ideas (Torrance, 1975) or the capacity to reason in an independent, original and/or effective manner (Sternberg, 1988) with a problem or to create something new (Guilford, 1950). In Vygotsky's view (1978) it is a quality inherent to the human essence insofar as each person becomes a flexible inventor of their own future and potentially contributes to the future of their culture through the development of creativity. This constitutes precisely the asset that University intends to nurture.

(IN)DEFINITION OF CREATIVITY

Notwithstanding being an abstract concept, thanks to the "passion for abstraction" that has dominated secular scientific study of human behaviour (Kagan, 1998), creativity is multifaceted and encompasses multiple human dimensions, and is hence difficult

to define. Despite being impossible to capture the "whole", E. P. Torrance (1988) advanced with a systematisation of the most relevant processes involved in creativity: experimentation of difficulties in grasping the knowledge, the formulation of hypotheses about these inconsistencies, the assessment and testing of the positive solutions, the revision of each of these solutions, and finally, communication of the results.

Undoubtedly the sphere relevant to creativity is the cognitive sphere. The cognitivist approach of creative solving of problems suggests the presence of two adjacent phases: the creation of something — generative process — and the examination, interpretation and assessment of something — exploratory process (Finke *et al.*, 1992). The mental processes involved in creativity would therefore include the recovery, association, summary, transformation, analogical transfer and also the reduction of categories. For the creative cognition model, variation in creativity resides in the different "mental agendas" that allow selection of the information generated (Bink & Marsh, 2000).

But while the cognitive processes are important in the description of creativity, others are equally relevant. Processes of a motivational, personal, emotional and contextual order should be taken into consideration in analysing creativity. Recent approaches to creativity highlight the confluence of multiple dimensions. Amabile (1983) emphasises the integration of cognitive, social, personality and motivational variables in the creative process which includes interaction among motivation towards a task, the capacities and relevant knowledge in a domain and the creative competencies.

Other personality traits, such as willingness to take risks, affectivity, humour, breaking through borders or limits (e.g. Sternberg, 1985), linked to socio-emotional competencies are at play with the cognitive components. Taking on challenges, dynamism, freedom, confidence and openness, time to let ideas mature, playfulness and humour, conflicts, backing up ideas, debating and also risk-taking are among the most relevant personal dimensions for the expression of creativity (Isaksen & Lauer, 1998). Openness, independence, intuition, preference for complexity, tolerance towards ambiguity, the drive to achieve standards or meanings, the *locus* of internal control and willingness to run risks are other dimensions mentioned as relevant for the creative process (e.g. Getzels & Csikszentmihalyi, 1975).

Owing to the multiple dimensions and their inherent complexity, the only way to arrive at a consensus as regards the definition of creativity is by using more general definitions, which are broad enough to cover the various theoretical approaches that aim to describe creativity. However, too wide a scope ends up not being useful in demarcating frontiers and leaves gaps in terms of understanding the processes involved. Notwithstanding, one can state, without hesitation, that creativity involves the ability to go beyond traditional ideas, rules, standards or pre-existing relations and create new ideas, forms, methods or interpretations with meaning[2].

To sum up, creativity can be viewed as the ability to surpass what already exists and create something new. Both these concepts are considered part of the essence of the human being, leading to the inevitably creative construction and reconstruction of the past, for the interpretation of the present and the forced reflection on the personal, cultural and social future. The ability to produce ideas, the ability to relate concepts coming from different fields of knowledge, the ability to find unusual or even novel solutions, the ability to detail, the ability to express feelings, as well as the ability to surprise others, all contribute to a definition of creativity that can form basis in assessing creativity and, ultimately, its encouragement.

ASSESSMENT OF CREATIVITY

The assessment of creativity is necessarily limited and reduced in that it is an indefinable, complex and limitless concept (Torrance, 1988). However, the most striking aspect of the creativity assessment paradox lies in the contradiction between the intended predictability underlying assessment and the unpredictable nature of creativity. Nevertheless, assessment of creativity is indispensable not only to describe the creativity level of the future social and cultural innovators, but also to analyse and understand the way educational practices should be modified so as to garner their maximum potential.

There are two kinds of creativity assessment: assessment of the creative process through standard

tests or problem solving tasks in several fields of knowledge and assessment of creative production. The first category includes the creativity tests. Although there have been sporadic attempts to assess creative potential through tests for over a century, psychometric concerns only appeared in the 1950s, after the challenge launched by Guilford to members of the American Psychological Association (Guilford, 1950). This proposal to study creativity in the common individual, using pencil and paper tests, led to the elaboration of what is still today the most commonly used test in the world, the TTCT — Torrance's Tests of Creative Thinking (Torrance, 1966).

The TTCT consist of relatively simple verbal and figurative tasks that involve lateral thinking skills and problem solving. The aims of this set of tests include the general understanding of creative thinking, namely lateral thinking, as well as creative expression, and also visual and spatial thinking (Torrance, 2000). The figurative tests, especially, require a deliberate effort to discover a creative solution to a problem and to structure what is incomplete (Torrance, 1966). These tests have led to one of the largest standard samples, with over 2000 research projects published, encompassing longitudinal and predictive validation (Cropley, 1999). The relation between performance in the test and future creative performance in real life is 0.62 and 0.57, respectively for males and females (Torrance, 1988).

At European level another creativity measure has been gaining some support. The Test for Creative Thinking — Drawing Production (TCT-DP), formulated by Urban and Jellen (1996) — aims to assess creativity using a holistic and gestaltic approach based on unfinished drawings and intends to assess cognitive and personality dimensions such as willingness to take risks, affectivity, humour, breaking through barriers or limits. It has proved to be a promising test in discriminating subjects who have high or low creativity levels in several areas of interest (Urban & Jellen, 1996).

However, assessment of the creative process has been carried out through solving other kinds of broader tasks, such as solving problems covering several fields of knowledge (e.g. Sternberg & Lubart, 1996) using a series of criteria that include novelty, suitability or the aesthetic value of the response. As an alternative, assessment of creative products seem to constitute a more ecological form of understanding this difficult (or even almost impossible) concept of defining, documenting and assessing creativity (Morais, 2005). The products reflect the personal traits of those who produce them, the process involved in their construction and the medium used, which are more similar to everyday or socially recognised situations in seeking to "grasp" the manifestation of creativity (Morais, 2005). Amabile (1996) believes that a product will be deemed creative if it is new and appropriated, useful, correct or of value for the task in question. Other authors point out other aspects such as relevance, suitability and originality (e.g. Nickerson *et al.*, 1985), being powerful (Perkins, 1981), novelty, adapted to reality, communicable, aesthetically pleasing and capable of change (MacKinnon, 1978), original novelty, transformational or germinal; and solution l; and also elaboration and summary, in the elegant sense, complex *versus* simple, understandable and well constructed (Besemer & Treffinger, 1981).

However, the assessment of creativity is not limited to analysis of creative production generated from tests or portfolios. One also has to consider self-assessment, even if it is not completely honest and impartial, as well as assessment carried out by others, whether they be peers, parents, teachers or external evaluators. Moreover, assessment of creativity should also include other measures such as observation, personality tests and biographical sketches. Only a combination of all this information can provide an all-encompassing assessment of creativity.

The purpose of the assessment is also a crucial variable in the conjugation of the information devised for the different forms of creativity assessment. If the aim is a more individualised intervention of creativity, what is important is to understand the way the various dimensions assessed through creativity tests play off one another. The relative importance of each of these dimensions depends on the subjectivity of the conception of creativity of whoever is doing the assessing and the intervening. Therefore, if creativity is considered as a synonym of many ideas, the number of responses given in a certain period of time also counts. If creativity is considered a synonym of different ideas when faced with the same stimulus, then what counts is the flexibility given by the number of categories used in the

response. If creativity is considered a synonym of ideas that are different to others, in other words, ideas that nobody else had, then the emphasis is placed on the statistical criterion — originality. If the detail, the number of details and depth of the creative production are valued, then the focus centres on the elaboration patent in the response. If creativity is considered a synonym of being different, namely in terms of an approach to a task expressed through emotions, then what is important is to deal with a series of complementary criteria in the test marks but used with less frequency in the research. And, finally, if creativity is considered a synonym of all of the above, then it is better to undertake a holistic appraisal of the protocol.

However, the assessment may have research as its objective. The purpose is, in the final analysis, to create the possibility of a more general intervention. It is within this scope that this analysis of the creativity of university students is located. An attempt is made to find out, to a greater or lesser degree of exhaustion, the creativity indicators of three groups of university students, with a view to bringing about a possible favourable change so as to enable the full development of the creative potential of future generations.

THREE RESEARCH STUDIES

The results of three studies are briefly presented, which aim to find out the current status of the creativity of university students and which involve analysis of a total of over 3500 responses to different items of creativity given by 262 subjects who attend higher education. While the aims of each of the studies were different, they all gave an overall picture of the creativity indicators of some university students, both in terms of results of standard tests and in terms of opinions about the theories behind creativity or self-assessment.

The creativity assessment tools used in these studies were the aforementioned TTCT and TCT-DP. In Study 1 a questionnaire was also used that aimed to find out the theories behind creativity and in Study 3 a creativity self-assessment measurement was registered.

Torrance's Tests of Creative Thinking (TTCT) is a set of tests that comprise a universal and timeless benchmark measurement of creativity. The criteria assessed are fluency (number of responses), flexibility (number of categories used in each sub-test), flexibility as indicated by the number of different categories of responses; originality, i.e. a criterion of statistical rarity; and also the elaboration, in other words, the amount of detail in the response (e.g. Torrance, 1966). The research over the last two decades has included, upon suggestion from Torrance himself (e.g. 1988) a series of alternative criteria that has proven promising such as creativity indicators. This assessment is more qualitative and includes an appraisal of some criteria of the cognitive-emotional order such as emotional expression; the presence of feelings and emotions, fantasy, humour, the richness of the details, or even a combination and summary of ideas. Other criteria can be of a more "technical" order, such as the communication of movement and action, breaking through barriers or internal or unusual visualisation, thus leading to a more enriching analysis of creativity (Torrance, 1988).

The full set comprises a verbal part and a figurative part. The two figurative tests that are most studied and revealing consist of filling in incomplete lines in different drawings and giving them a title (Test 2) and drawing based on parallel lines (Test 3 in version A).

The Test for Creative Thinking — Drawing Production devised by Urban & Jellen (1996) claims to be able to ascertain in a more comprehensive and holistic form the overall creative potential of the individual. It also presupposes assessing not only motivational variables and cognitive traits, but also social obstacles to creativity. The aspects assessed include: Continuations; Completions; New elements; Connections made with lines; Connections made to produce a theme; Boundary breaking that is fragment dependent; Boundary breaking that is fragment independent; Perspective; Humour, affectivity and expressive power of the drawing; Unconventionality A; Unconventionality B — symbolic, abstract, fictitious; Unconventionality C — symbolic, figure; Unconventionality D — non-stereotyped; and also Speed.

Study 1

In the first study (Bahia & Nogueira, 2005) 18 students from different fields of knowledge took part. The study aimed, on the one hand, to compare the

responses of students from different areas of knowledge to the TTCT (complete version), and on the other hand to assess the underlying theories of creativity in terms of process and product. In general terms, there are some very creative students and some very uncreative ones in each of the groups and differences can be seen in the behaviour of each of the groups in the figurative and verbal tests. In the figurative tests the art and science group students are more fluent, flexible and original, with the results from the arts group considerably higher than those of the other groups. In the verbal tests, the humanities group almost always out-performed the others. It was also seen that students who obtained higher results in the four "classic" criteria also distinguished themselves in the complementary criteria that aimed to measure emotional expressiveness and assess the use of the technique to express an idea.

In more specific terms, in this small sample the Humanities students showed better performance in fluency, flexibility and originality in the verbal tests and the Arts students performed better in the figurative tests (the only ones that include this assessment dimension). The Science students did well in some of the figurative tests in terms of originality and flexibility and in two of the verbal tests in terms of fluency and originality.

In terms of representations of creativity, the participants in this study placed the emphasis on the creative thinking process and not on the solutions. They refer more to the generative processes (Finke *et al.*, 1992), in other words, the creation of something innovative through thinking or the imagination and less to the exploratory processes. They associate creation of ideas or products to a solid basis of knowledge and believe that creativity can be expressed in multiple ways. The data that stands out in analysing the content of the protocols is unanimous reference to the fact that innovation is implicit in creativity and the absence of the concept of flexibility in the conception of creativity.

Study 2

This study involved 100 3rd and 4th year Psychology Degree students from Lisbon University and a private university (Nogueira *et al.*, 2006). The specific aim was to compare the results of the tests 2 and 3 of the TTCT and TCT-DP. The data suggested a positive correlation between originality and production of the Torrance tests and the final results of the Urban and Jellen test.

Comparing the results obtained by these 100 students in the TTCT with the results obtained by 246 pupils of the final years of Secondary Education (Bahia & Nogueira, 2006; Melo *et al.*, 2006), no differences were found apart from the tendency for the university students to score better in the alternative criteria (cognitive-emotional and technical) despite being less fluent, i.e. they produce fewer answers. However, when making an assessment in relation to flexibility, originality and elaboration according to fluency, the flexibility of the university students is slightly above that of Primary and Secondary School pupils. Also comparing the results of these students with those of the group of 81 teachers from different subject groups and teaching levels, one sees that the university students show substantially less creativity than the teachers.

Compared to a sample from German university students, the results of the Portuguese students are slightly below the German average in version A of the TCT-DP and considerably below it in version B, carried out after the first. This suggests a certain disinvestment in carrying out the second version (version B), at least compared to the German sample, where the students performed better in the second test.

The group of 44 students from Lisbon University also answered questions that aimed to check the overall uptake in the assessment of one's own creativity. As regards the overall assessment of the task to assess creativity, only three subjects admitted they did not like doing the task. The most popular test for most of the subjects (70%) was test 3 of TTCT (parallel lines), as it proved to be a most stimulating challenge, in that it forced one to have many different ideas.

Study 3

In a third study the answers to the TTCT and TCT-DP of 144 students from the 1st Cycle of the Integrated Master's in Psychology at Lisbon University were analysed and the self-assessment of creativity registered. As regards the performance in the TTCT, the inclusion of alternative criteria enables positive differentiation between the Primary and Secondary School pupils and the group of students

who took part in study 2. More specifically, the only aspect in which these students seem to stand out is the inclusion of humour, fantasy or emotions in their answers. In relation to the performance in the TCT-DP the results are very similar to the Study 2 sample, in other words, they are below the performance of the German students.

In relation to the self-assessments, these students classified their creativity abilities as very poor, in other words they attributed an average of 2.5 in a scale from 1 to 5, which may indicate they do not believe they are able to be creative. The self--assessment of creativity and the TTCT and TCT--DP scores vary considerably, with no regular pattern emerging. Among the 10 most creative students in both tests, three assessed their creativity at level 4, four at level 3 and three at level 2, and this distribution coincided with that of the 10 students who returned the weakest creativity indicators. When compared with the sample of 81 teachers, these students are more modest than the teachers in assessing themselves (average of 2.5 against 3.5) who are indeed more creative.

GENERAL RESULTS

From the analysis of the data obtained in these three studies, one can see that some university students score above average in creativity tests while others score far below the average. On average, higher education students are more creative than the students of 13 Primary and Secondary School classes, but are much less creative than a group of teachers.

The university students represent creativity as a process that allows the generation of new ideas, attributing little relevance to the process of exploring alternatives to solve problems and flexibility in thinking. In terms of self-assessment, the students of this educational level perceive themselves as having little creativity — they do not believe they are very creative.

CONCLUSIONS

Based on this study one cannot state that university students are uncreative. Such a statement would only be possible if the definition of creativity was consensual and if the assessment carried out embraced all the aspects involved in creativity. However, the responses obtained by the 262 participants in the three studies leading to measurements that universally assess creativity do not allow us to refute the initial statement. One can only say that the university students tend not to show indications of a highly developed level of creativity.

The most striking datum from this research is that the creativity of the university students assessed is more similar to that of Primary and Secondary School pupils than that of adults. However, taking a more detailed look one sees that the university students show more indications of ability for emotional expression and use of unconventional drawing techniques than the younger pupils. Moreover, these students tend to be slightly more flexible and original than Primary and Secondary School pupils, although they are less fluent, in other words, they give fewer responses, and seem rather to invest in fewer but wide-ranging ideas, and do not go for repetitions.

They are, nevertheless, very stereotyped in that they respond in a conventional and not very original manner, finding it difficult to break through barriers. As an example, the likelihood of a high score in the TCT-DP is to a large extent dependent on recognising an element that is outside the frontiers suggested by the task. Only one in every hundred students included this outside element in their answer. Likewise, only 2 in every 100 risk linking the elements in the TTCT, in contrast to the group of teachers assessed with the same tests who associated elements three times more often.

These results suggest that the creativity of the Portuguese university students is not more developed than younger pupils. This panorama worsens when comparing the creativity of the Portuguese students with that of students from other countries. The situation merits special attention, even more so if you take into account that the ability to innovate and analyse critically is not as developed as desirable. In a meticulous analysis of the data concerning each criteria of the creativity score assessments, one can see that the university student produces few ideas that are different, original or detailed in relation to the various categories of knowledge. In overall terms, the students proved not to be particularly creative.

What measures can be taken to increase the creativity indices of the university students?

In specific terms, the creative ideation of the students assessed seems to be beyond what would be desirable. However, having lots of ideas is a necessary condition for expressing creative potential, and consequently it would be desirable to increase the number of ideas that these student can come up with. VanTassel-Baska (1998) states that boosting potential in creativity in formal education contexts involves developing the ability to takes risks intellectually through activities that arouse your interest, chosen from a list of alternative ideas and perspectives. As such, stimulation towards seeking problems and themes of debate is in line with the idea that creativity involves the discovery of problems and not only the solving of problems (e. g. Getzels & Csikszentmihalyi, 1975).

Given that flexibility is a crucial characteristic of creativity, taking on different perspectives, even if unusual, increases production. However, flexibility can be viewed in different ways. It may be the production of different ideas when faced with the same stimulus or idea. But it could also be exploration of the same theme based on different stimuli or ideas. In other words, flexibility can be viewed as an issue of many different categories or different elements within the same category. Regardless of the kind of flexibility in question, creativity implies flexible work (Fryer, 1996), especially taking on different perspectives. Excessive structuring of tasks can constitute an obstacle to the creative solving of problems and to learning about what it is to take risks (Sternberg & Lubart, 1996).

However, having ideas that are different to those of others, ideas that nobody else has, is also crucial for the expression of creativity. Originality is achieved when one does not act in line with what is expected. However, the culture in which we live is full of beliefs that constitute barriers to creativity, not only at social level, but also in economic and cultural terms (Nieman & Bennet, 2002). These beliefs clamour for conformism, comparison, pressure towards realism, lack of space and time to develop curiosity (e.g. Sternberg, 2001). Nevertheless, one of the characteristics of creativity most commonly described is the endeavour to overcome obstacles, take sensible risks and tolerating ambiguities (e.g. Barron & Harrington, 1981; Sternberg & Lubart, 1996). Therefore, the opportunity to develop these personal traits can empower the expression of creativity and contribute towards a society that gives the opportunity to the production of knowledge and not its mere reproduction.

The amount of detail and depth of creative production should not be underestimated. It is in developing one's response that often one not only "fine-tunes" the idea but one also produces new ideas. In this elaboration, time and space should be given to the aspects that are most closely connected to emotions. However, creativity involves a dynamic among all the aspects mentioned, whose expression is empowered by the establishment of a creative climate that supports and encourages new productions (Amabile, 1999). As stated by Fryer (1996), creative education implies freedom to explore and question, which is important to provide the opportunity to go into depth, to exhibit, to discover and solve a lot of issues and problems based on the readings and debates inside and outside the specific domain of knowledge one is seeking to impart. A creative climate should not apply pressure towards realism, whereby in "planting one's feet firmly on the ground" one inhibits the willingness to invent (Amabile, 1999). This creative environment fosters the interest to learn and nurtures flexible and critical reflection, arousing curiosity, stimulating originality, encouraging an active posture that transforms the reality.

However, the search for problems and ideas depends on clearly structuring the aims to be achieved, which are essential for creativity to be expressed (Amabile, 1999), as creativity depends on the development of converging and diverging skills (e.g. VanTassel-Baska, 1998). Hence, the creation of well defined but not excessively rigid goals, leads to the desirable endeavour to overcome obstacles, to take risks, to tolerate ambiguities, as well as a taste for challenging the masses, immersing oneself in a task, passion for work and concentration on the activity itself and not its possible rewards, which constitute aims of University itself.

The results obtained in the research described can be viewed in the light of theories from many authors involved in encouraging creativity in the educational context who perceive the teaching in general as uncreative and accuse it of placing more

value on reproduction instead of productive and creative learning (e.g. Hennessey, 2003). A lot rides on providing the knowledge in a framework that enables the selection of generated information (Bink & Marsh, 2000), the search for new problems and questions (Getzels & Csikszentmihalyi, 1975) and the production of new knowledge. The warning of Alexander Graham Bell, "never walk a trodden path, as it will only lead to where other have already been," will certainly help the creation of a University that produces more creative students.

Endnotes

1. According to point 3 of Article 11, Subsection III of Law no. 46/86, of 14 October (Base Law of Education System) which refers to the goals of university education.

2. Webster Encyclopædia, 1996.

Bibliographical references

Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.

Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.

Amabile, T.M. (1999). How to kill creativity. *Harvard Business Review*, 76, 5, pp. 77-87.

Bahia, S. & Nogueira, S. I. (2005). *A criatividade dos estudantes universitários: como difere com a área de conhecimento*. Retrieved September 2007 from http://fs-morente.filos.ucm.es/publicaciones/iberpsicologia/lisboa/bahia/bahia.htm

Bahia, S. & Nogueira, S. I. (2006). A criatividade emerge na adolescência? Uma abordagem preliminar. *Sobredotação*, 7, pp. 161-175.

Barron, F. & Harrington, D. M. (1981). Creativity, intelligence and personality. *Annual Review of Psychology*, 32, pp. 439-476.

Besemer, S. & Treffinger, D. J. (1981). Analysis of creative products: review and synthesis. *Journal of Creative Behavior*, 15, 3, pp. 158-178.

Bink, M. L. & Marsh, R. L. (2000). Cognitive regularities in creative activity. *Review of General Psychology*, 4, pp. 59-78.

Boisvert, J. (1999). *La formation de la pensée critique. Théorie et pratique*. Canada: De Bœck Université — Ed. du Renouveau Pédagogique.

Cropley, A. J. (1999). Definitions of creativity. *In* M. A. Runco & S. Pritzker (eds.), *Encyclopedia of creativity*. Volume 1. San Diego: Academic Press, pp. 511-524.

Csikszentmihalyi, M. (1988). Society, culture, and person: a systems view of creativity. *In* R. J. Sternberg (ed.), *The nature of creativity: contemporary psychological perspectives*. NY: Cambridge University Press, pp. 325-339.

Ennis, R. H. (1989). Critical Thinking and Subject Specificity: Clarification and Needed Research. *Educational Researcher*, 18, 3, pp. 4-10.

Finke, R. A.; Ward, T. B. & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications*. Cambridge, MA: MIT Press.

Fryer, M. (1996). *Creative Teaching & Learning*. London: Paul Chapman Publishing.

Getzels, J. W. & Csikszentmihalyi, M. (1975). From problem solving to problem finding. *In* I. A. Taylor &. J. W. Getzels (eds.), *Perspectives in creativity*. Chicago: Aldine Publishing, pp. 90-116.

Guilford, J. P. (1950). Presidential address to the American Psychological Association. *American Psychologist*, 5, pp. 444-454.

Hennessey, B. A. (2003). The social psychology of creativity. *Scandinavian Journal of Educational Psychology*, 47, pp. 253-271.

Isaksen, S. G. & Lauer, K. J. (1998). Relationship between cognitive style and social culture. *European Journal of Personality*, 12, pp. 187-198.

Jonassen, D. H. (1996). Using Mindtools to Develop Critical Thinking and Foster Collaboration in Schools. *In* D. H. Jonassen (1996), *Computers in the Classroom: Mind tools for critical thinking*. Columbus: OH: Merrill/ Prentice Hall, pp. 23-40.

Kagan, J. (1998). *Three Seductive Ideas*. Cambridge, MA: Harvard University Press.

Litecky, L. (1992). Great teaching, great learning: Classroom climate, innovative methods, and critical thinking. *In* C. A. Barnes (ed.), *Critical Thinking: Educational imperative*. San Francisco: Jossey Bass, pp. 83-90.

Lipman, M. (1991). *Thinking in education*. Cambridge: Cambridge University Press.

MacKinnon, D. (1978). *In Search of Human Effectiveness: Identifying and developing creativity*. Buffalo, NY: Bearly Limited.

Melo, A.; Ornelas, M.; Gomes, N.; Lopes, R. & Máximo, R. (2006). *África em Portugal; a necessidade de inclusão de referências culturais africanas no Currículo de Educação Visual do 3º Ciclo*. Relatório de Actividades de Integração da Profissionalização em Serviço da Faculdade de Psicologia e de Ciências da Educação da Universidade de Lisboa.

Morais, M. F. (2005). A avaliação da criatividade: A opção pelos produtos criativos. *Recre@rte,* 4. Retrieved September 2007 from www.iacat.com/Revista/recrearte

Nickerson, R. S.; Perkins, D. & Smith, E. E. (1985). *The Teaching of Thinking*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Nieman, G. & Bennet, A. (2002). *Business Management: A value chain approach*. Pretoria: Van Schaik Publishers.

Nogueira, S. I.; Bahia, S. & Almeida, L. (2006). Dois testes de criatividade: a avaliação da mesma criatividade? Comunicação apresentada no *VI Congresso da ANEIS: SobreSobredotação, perícia e Meta desEnvolvimento: Aprenderaexcelência*, Coimbra, Novembro.

Paul, R. (1992). *Critical thinking: What every person needs to survive in a rapidly changing world*. Santa Rosa, CA: Foundation for Critical Thinking.

Perkins, D. N. (1981). *The Mind's Best Work*. Cambridge, MA: Harvard University Press.

Piaget, J. (1972). *Où va l'éducation?: comprendre, c'est inventer*. Paris: Denoël/Gonthier.

Sternberg, R. (1985). Implicit theories of intelligence, creativity and wisdom. *Journal of Personality and Social Psychology*, 49, pp. 607-627.

Sternberg, R. J. (1988). Mental self— government: a theory of intellectual styles and their development. *Human Development*, 1, pp. 197-224.

Sternberg, R. J. (2001). What is the common thread of creativity? Its dialectical relation to intelligence and wisdom. *American Psychologist*, 56, 4, pp. 360-362.

Sternberg, R. J. & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, 51, 7, pp. 677--688.

Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking: Technical— norms manual (research ed.)*. Princeton, NJ: Personnell Press.

Torrance, E. P. (1975). *Tests de pensée créative de E. P. Torrance: Manuel*. Paris: Les Editions du Centre de Psychologie Appliqué.

Torrance, E. P. (1988). The nature of creativity as manifest in its testing. *In* R. J. Sternberg (ed.), *The nature of creativity: contemporary psychological perspectives*. NY: Cambridge University Press, pp. 43-75.

Torrance, E. P. (2000). *On the edge and keeping on the edge*. Westport, CT: Greenwood Publishing Group.

Urban, K. K. & Jellen, H. G. (1996). *Test for Creative Thinking — Drawing Production (TCT--DP)*. Frankfurt: Swets Test Services.

VanTassel-Baska, J. (1998). Counseling talented learners. *In* J. VanTassel-Baska (ed.), *Excellence in educatinggifted and talented leamers*. 3rd edition. Denver, CO: Love, pp. 489-510.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Translated by Thomas Kundert