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Critical thinking: Its relevance for education in a shifting society

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The amount of information and variety of situations tackled on a daily basis call for new cognitive functions, namely combining knowledge, experience and intellectual abilities. Critical thinking is valued as a higher-order type of reasoning and a skill transversal to the educational organisms. We introduce some definitions suggested in the literature, and describe the cognitive functions responsible for critical thinking used in learning and problem solving situations. We then present the most used assessment procedures, illustrating with instruments as well as programs and curricular planning implemented in the classroom to teach and develop critical thinking. Finally, we highlight the importance of further investigation, in order to reach a convergence of theoretical and practical elements needed to define critical thinking.

Keywords: Critical thinking, intelligence, reasoning, transversal skills, adult cognition.

Pensamiento crítico: su relevancia para la educación en una sociedad cambiante

El volumen de información y la multiplicidad de situaciones a enfrentar diariamente exigen nuevas funciones cognitivas, particularmente combinando conocimiento, experiencia y habilidades intelectuales. El pensamiento crítico es valorado como una forma superior de razonamiento y una competencia transversal a los sistemas educativos. Se presentan algunas definiciones presentes en la literatura, describiendo las funciones cognitivas responsables por el pensamiento crítico en las situaciones de aprendizaje y de resolución de problemas. Se exponen los procedimientos más empleados en su evaluación, ilustrando con algunas pruebas y con algunos programas y planificación curricular implementados para la enseñanza y el desenvolvimiento en la clase. Finalmente, se señala la importancia de continuar haciendo estudios que busquen la convergencia de elementos teóricos y prácticos asociados a la definición de pensamiento crítico.

Palabras clave: pensamiento crítico, inteligencia, razonamiento, competencias transversales, cognición en la edad adulta.

Understood by some as an innate aptitude, considered by others as a learned set of problem solving skills, the topic *intelligence* does not enjoy of the consensus of the researchers (Almeida, 1994; Almeida, Guisande & Ferreira, 2009). In an attempt to define and operationalize this construct in opposition to the psychometric tradition, Sternberg (2003) presents the concept of *developing expertise*, suggesting that intelligence refers to a developing potential, which results from the interaction between genetic factors and life contexts. Such interaction provides individual differences in cognitive abilities and in the performance of daily situations.

The psychometric approach has been pointed out as being excessively focused in the immutable and analytical aspects of intelligence, regardless of its changeable nature or the impact of people's experience. This classic perspective has devoted little attention to the mechanisms inherent to the improvement of each individual's cognitive and resolute efficiency in face of learning, practice or mere experience (Sternberg, 1999, 2003). This criticism suggests that there are cognitive abilities or even forms of intelligence that are of useful to individuals, both in their daily lives and in their line of work, that don't seem to have been valued by traditional instruments of intelligence assessment and that are also undervalued by the education system (Almeida et al., 2009; Gardner, 1983; Sternberg, 1985). We believe that one of these cognitive abilities claiming a deeper analysis is *critical thinking*.

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Critical thinking in today's information society

In a social era characterized by a large amount of information, easily accessible and with which people see themselves confronted by at every moment, it is crucial to know how to apprehend the information that is essential and submit it to an appropriate treatment, whether it is to accept it as reliable and worthy of being processed, or whether it is to classify it as fallacious and disposable (Halpern, 1999). In this sense, and given the everlasting and swift social transformations, critical thinking stands out as a fundamental cognitive resource (Halpern, 1998; Ku, 2009; Phan, 2010). It might even constitute itself as the decisive element to successfully accomplish, succeed or be successful when performing the multiplicity of tasks and situations we tackle on a daily basis (Bailin, Case, Coombs & Daniels, 1999a, 1999b; Halpern, 1998; Phan, 2010).

Critical thinking is perceived as a cognitive capacity that allows one to convey meaning to disperse ideas, capacitating people to meaningful dialogue with others (Brady, 2008) and to experience satisfying feelings, both in their personal and social lives (Saiz & Rivas, 2010). This mechanism permits a better adjustment to the surrounding environment (Rivas & Saiz, 2010), becoming of great use in school and work contexts, for in both cases there is required a capacity to give a quick and efficient response to the more varied challenges (Carroll, 2005; Pithers & Soden, 2000). As a matter of fact, research in this area associates a higher degree of critical thinking to superior levels of control and proactivity in school education and daily life experience (Carroll, 2005; Kuhn, 1999). Specifically in the school context, critical thinking skills allow students to organize their learning, and also to supervise and evaluate their school tasks, which positively affects their academic performance (Paul, 2005; Phan, 2010). All these aspects illustrate the extreme relevance and the enduring topicality of critical thinking, whether it is in the most diverse daily situations or as a line of study that is important to deepen and better comprehend (Bailin et al., 1999a).

Defining critical thinking

But what can really be understood as critical thinking? In reality, there are different definitions, although resulting from proximal assumptions and maintaining some similarity amongst them (Allen, Rubinfeld & Scheffer, 2004; Halpern, 1999, 2006; Yanchar, Slife & Warne, 2008). The conceptual diversity comes from the fact that critical thinking is studied in different scientific subjects and applied in multiple contexts (Phillely, 2005). In this sense, this area has benefited from the interest of researchers in the fields of Education, Psychology or Philosophy (Phan, 2010; Yanchar et al., 2008).

Seeking some level of convergence from the different definitions available in the literature, critical thinking can be defined as a more complex and significantly demanding logic form of higher-order reasoning (Brady, 2008; Phillely, 2005). In terms of its operationalization, critical thinking presumes a repertoire of faculties: articulation of ideas; meaning elicitation; consideration of divergent arguments and search of evidence to evaluate the legitimacy of each one; formulation of hypothesis; justification of personal arguments and beliefs; decision making; problem solving; monitoring and evaluation of personal cognitions and actions (Facione, 2010; Halpern, 1998, 1999, 2006). To sum it up, and accordingly to Halpern (1998), subjacent to critical thinking seem to be elemental capacities of idea/argument decomposition and synthesis, but also the capacity to evaluate the performance and products resulting from personal action, during and after the process. We can synthesize the dimensions that constitute critical thinking or the aspects that are implied in its definition by suggesting that this is a multifaceted cognitive construct, with an inductive, deductive and creative nature, comprising an heterogeneous set of skills and necessarily implying the motivation to use them (Bailin et al., 1999a; Facione, 2010; Halpern, 2006; Phillely, 2005).

Guided by a goal to be achieved (the cognitive finality or direction), critical thinking translates the employment of cognitive aptitudes and the use of one's knowledge base to critically analyze facts or beliefs,

in order to produce rational knowledge that can direct behavior (Carroll, 2005) and sustain daily decision making and problem solving (Saiz & Rivas, 2010). This way, it implies a flexible and reflexive attitude, including the analysis, evaluation and correction of one's activity and progress towards the established goal, as well as the motivation to pursue that desired goal (Halpern, 1998). Therefore, its relevance to school learning situations is clear: on the one hand, critical thinking is a resource that allows the student to adopt an analytical and evaluative attitude towards his/her performance, perfecting the quality of the learning process; on the other hand, the learning process allows the gradual improvement of the skills characteristic of critical thinking (Paul, 2005; Phan, 2010).

The authors suggest that, more than the potential itself, the decisive element here is truly a proactive and motivated attitude. If the motivational component—which cultivates the application of theoretical and practical components—is absent, a strong knowledge about critical thinking skills and the mastery in their use will prove to be insufficient (Facione, 2010; Halpern, 1999). Critical thinking entails the translation of cognitive skills into behavior (Saiz & Rivas, 2010; Sternberg, 1997), which will not happen if deprived of motivation (Facione, 2010). The motivational factor—emphasized by some authors as being the essential feature for the development of skill and success in school (e. g. Halpern, 1999; Sternberg, 1999)—might help to understand the reason why some students' execution quality isn't compatible with their cognitive potential, assessed, for instance, with intelligence assessment tests. This explains why some students, despite having potential, do not perform particularly well, and also why others less promising but more motivated perform better (Facione, 2010).

At last, critical thinking stands additionally on some level of creativity, which is accountable for the appetite to anticipate possible results, and also to produce and implement particular alternatives of action in each situation (Bailin et al., 1999b; Facione, 2010). The deliberation of arguments that are divergent of one's own or the analysis of an argument accordingly to multiple perspectives are visible in

the person who reveals critical thinking (Carroll, 2005), as well as the acceptance of new ideas, and an inquisitive and interested search for accurate knowledge regarding the situation at hand (Bailin et al., 1999a; Paul, 2005).

From the analysis of these three essential aspects of critical thinking emerges the possibility of it being the characterization of a fifth stage of cognitive development. It is important to bear in mind that in his theory of cognitive development, Piaget (2008) claimed the existence of four stages in which such development occurred, from birth to late adolescence (sensorimotor, preoperatory, concrete operations and formal operations). The literature gives evidence of a post-Piaget group of theoreticians trying to update the author's approach; they suggest the establishment of a subsequent stage of intelligence development, which is very much associated to the individual's epistemic status and to the knowledge role in the structuring of intelligence and its manifestation beyond adolescence and throughout adulthood (Feldman, 2004; King & Kitchener, 1994; Marchand, 2002).

In such a stage, it is assumed that knowledge isn't factual, but rather circumstantial and relative, strongly marked or dependent of the individual's idiosyncrasies and the specificities of the surrounding environment. This way, thought as the potential of being continually developed, which derives from the possibility of integrating disconnected types of knowledge that are susceptible of being reformulated in personal schemes of reality representation. Such openness to experience and capacity to tolerate ambiguity is a consequence of a more flexible and divergent form of thinking, capable of operating with contradiction and not edified on laws of pure logic (Bruine de Bruin, Fischhoff & Parker, 2007; Marchand, 2002). In face of this, an equivalence of this type of thinking with the one we have been referring to as critical thinking is pondered, since both relate to a superior reasoning that presumes an inquisitive attitude fit for generating possible and adequate solutions to the processing of rather complex information and problem solving.

In conclusion, critical thinking appears to be a higher-order type of reasoning employing cognitive skills and directed by a motivational component in problem solving. Being a contextual type of thinking, it acts on a knowledge base (which also includes the individual's knowledge concerning his/her own skills), recurrently accessed and restructured, which implies supervision of the self in benefit of pursuing the goal previously defined (Bailin et al., 1999b; Halpern, 2006; Pithers & Soden, 2000). Accordingly to Bruine de Bruin et al. (2007), these critical thinking characteristics combine a group of critical skills, namely inference and application of relations, pondering and evaluation of alternatives, or self-regulation and metacognition. This allows us to anticipate a great variability amongst subjects, for each person adopts, in each situation and for the obtaining of a desired result, a line of action that is somehow distinctive. Recalling the old saying *Rather be smart than intelligent*, it is possible to unravel the popular wisdom it encloses: we can realize that being *smart* is another way of perceiving intelligence. In other words, it describes the person's critical use of his/her resources or cognitive skills in order to achieve a desired aim.

Assessing critical thinking

Alongside the definition of critical thinking it is necessary to contemplate the assessment as well (Ku, 2009; Rivas & Saiz, 2010). And such as the definition of critical thinking is imbued with disagreement, its assessment equally lacks convergence (Brookfield, 1997). On the one hand, there is a myriad of instruments to assess this construct, frequently indicted of lacking validity (Allen et al., 2004); on the other hand, there seem to be few adequate instruments to assess critical thinking in all its extent (Ennis, 1993), in particular in what refers to its development (Ku, 2009). For instance, Colucciello (1999) identifies the absence of assessment instruments that are capable of simultaneously comprising the cognitive and motivational components of critical thinking.

Despite the difficulties inherent to its measurement, critical thinking assessment is feasible (Rivas & Saiz, 2010). Ku (2009) presents the following critical thinking assessment instruments as the most well-known: Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980); Ennis-Weir Critical Thinking Essay Test (Ennis & Weir, 1985); Cornell Critical Thinking Test (Ennis, Millman & Tomko, 1985); California Critical Thinking Skills Test (Facione, 1990); and, Halpern Critical Thinking Assessment Using Everyday Situations (Halpern, 2007). Referring to the latter, it seems to fill a gap in the available critical thinking assessment instruments scenario (Ku, 2009; Rivas & Saiz, 2010). In fact, it grasps both cognitive and motivational components, thus offering a comprehensive multidimensional view of the construct. To do so, it makes use of open-answer and multiple-choice questions, concerning daily problematic situations with which the subjects can easily relate to (Ku, 2009).

If we take a step back to the definition of critical thinking and recall its dimensions, authors generally presume that there are three main aspects composing this construct: knowledge base, motivation and cognitive operations. Regarding the latter facet, usually referred to as critical thinking skills, which are associated to the strategies applied in order to attain a goal set *a priori*, some difficulties are produced when wanting to try to identify which and how many are these skills. Nevertheless, we find Halpern's (1998) suggestion more adequate, as it includes verbal reasoning, argument analysis, hypothesis testing, probability consideration, and decision making and problem solving. In the same way, Facione (2010) resorts to cognitive functions in order to put critical thinking skills into practice, considering such skills to be interpretation, analysis and evaluation, inference production, explanation and self-regulation; this enables us to assume the need for particular assessment exercises that are prone to capture the specificities of these functions.

One of the setbacks of assessing critical thinking appears to be the outcome of the nature of the construct itself: being this a complex type of reasoning characteristic of higher-order thinking, it becomes intricate to carry out a precise measurement resorting to assessment instruments

composed of items or situations that are necessarily delimited (Brady, 2008). Likewise, it is noticeable that some authors neglect the effort of contextualizing their research at a theoretical level, often resulting in a quest for critical thinking assessment deprived of proper theoretical framing, that doesn't enable the comprehension and explanation of the construct under analysis (Yanchar et al., 2008). It is important that the attempts to assess critical thinking derive from previous conceptualizations and their clarification (Brookfield, 1997; Yanchar et al., 2008).

A criticism that is usually pointed at conventional intelligence assessment tests insinuates that these instruments disregard the role of the context to the quality of the subject's performance (Almeida, 1994; Sternberg, 1999). As a matter of fact, nowadays only a small number of authors defend the possibility of assessing the essence of intelligence without considering it, in part, as a product of the subject's learning experiences and their cultural contexts of life (Almeida, 1994). Daily life contexts have a meaningful impact on cognitive functioning, making it necessary to secure that the power of such circumstances is taken into consideration when assessing intelligence. In fact, people don't live in an aseptic environment, invulnerable to its stimuli. From here derives the need to weigh the contextual variable when defining and assessing critical thinking (Sternberg, 2003; Yanchar et al., 2008).

In regard to the critical thinking assessment instrument's format, open-answer questions are described as being prone to a more efficient evaluation, when compared to the multiple-choice ones (Ennis, 1993). The latter are useful to assess the cognitive dimension of the construct, but do not properly regard the motivational dimension; additionally, they restrain the expression of critical thinking, making it impossible to foresee how the subject will react in face of daily life challenges (Ku, 2009). By using open-answer questions, it is possible to identify which critical thinking skills are the most used, conferring better visibility to the student's reasoning (Rivas & Saiz, 2010). Nonetheless, there can be anticipated one difficulty here: assessing answers that were obtained with a more open format can be expected to be more time consuming and ambiguous.

In conclusion, it can be inferred that a clear definition of what really is the structure of critical thinking is vital, and that the elaboration of valid and comprehensive assessment instruments is indispensable. However, besides its definition and assessment, it is necessary to additionally consider intervention on critical thinking and its skills or basic components. In fact, assessment gains particular social relevance if serving as a foundation or support to the efforts of intervention (Rivas & Saiz, 2010). This way, it matters to think over school settings, more specifically the guidelines that dictate the education system and teachers' practice, in order to examine how they stand about this topic inherent to cognition, learning processes and problem solving.

Developing critical thinking

The true mission of education is commonly described as being the promotion of thinking skills, critical natured thinking skills to be more precise (Almeida, 1996; Barnes, 2005; Noddings, 2008; van Gelder, 2005). This issue is particularly significant in higher education, considering that it is by means of a university education that students get equipped to enter the labor market, acquiring and perfecting resources with which they can face future challenges (Barnes, 2005). This process occurs by using what they have learned along their university education years and from the knowledge they have acquired and that is demanded in their line of work (Halpern, 1998; Ku, 2009).

Despite the importance conveyed by the education system about developing critical thinking skills, effective efforts to put such skills into practice and to promote their training hasn't been noticeable so far (Noddings, 2008). More complex thinking skills aren't covered by conventional teaching and assessment formats, which are still too focused on data transmission, memorization of factual information and subsequent evocation of knowledge in evaluation situations (Brady, 2008; Paul, 2005; Pithers & Soden, 2000). To a certain extent, this may be produced by some unawareness usually revealed by teachers about what

critical thinking is in fact and how it can be integrated in their teaching and evaluating methods (Paul, 2005). Such a conventional approach, in which teaching and learning processes are centered on analytical skills and critical thinking is omitted, should be corrected (Barnes, 2005), for it doesn't provide true opportunities for the students' cognitive development (van Gelder, 2005). According to a few authors, there should be an intentional effort to go beyond the curriculum and to implement changes in each teacher's pedagogic method and in the education system itself, in aim to fully grasp critical thinking skills (Kuhn, 1999; Paul, 2005).

In dependence of the criticism made to traditional education methods and their excessive emphasis in data transmission, another one rises, upon which students are perceived as a passive receptacle of the knowledge offered by teachers (Barnes, 2005; Brady, 2008). By tradition, teachers are conceived as experts who must transmit their knowledge to students, whereas students are rewarded for memorizing information merely for testing situations, and not for elaborating their own ideas and developing a reasoning that is both open-minded and critical. As a consequence, students aren't very active learners: they resort to a more memory-based approach, rather than a comprehensive one, to acquire curricular contents, they employ little effort to elaborate ideas on their own, and they don't develop the skills needed to autonomously solve their daily problems (Barnes, 2005; Brady, 2008; Facione, 2010).

Ideally, the education system should permit each student's expansion in a number of curricular and cognitive areas, which is feasible by means of teaching the various thinking skills. These are susceptible of improvement, with the possibility of being learned, internalized and independently applied by students in multiple circumstances, assisting them to think more efficiently when dealing with distinct real-life situations (Halpern, 1998, 1999, 2006; Noddings, 2008). This is possible because this type of reasoning supports the development of analytical, critical and decision making skills, which are useful on a daily and transversal basis, and increase learning and problem solving quality (Bruine de Bruin et al., 2007).

In this context, the teacher's role is to guide students, allowing them an active and regulated part in their way to developing critical thinking (Barnes, 2005; Paul, 2005). Such a process encloses the theoretical, practical and motivational components of critical thinking: the introduction to the implied concepts and understanding, which provide for the enrichment of one's knowledge base; the familiarity, perfecting and expansion of a set of skills needed to reflexive thinking; the strengthening of the disposition to put knowledge and skills into use (Bailin et al., 1999a; Brady, 2008). This way, critical thinking must be valued by education systems, in order to make propitious an environment in the class-room that allows and stimulates the adoption of a reflexive attitude towards the quality of one's thinking (Colucciello, 1999).

In sum, we can accept that critically thinking isn't an innate and intuitive ability, spontaneously sprouted (Saiz & Rivas, 2010). On the contrary, it emerges from the learning-teaching process, being gradually and deliberately acquired, and assuming a previous and symbiotic mastery of a set of basic skills, such as reading comprehension, argument analysis and production, or still, search for evidence to stand for a particular point of view (Facione, 2010; van Gelder, 2005). In concern to the binomial *nature versus nurture*, critical thinking definitely seems to belong to the scope of the second (Brookfield, 1997), considering that it relies on explicit, continued and persistent teaching (Bailin et al., 1999b; Ennis, 1993; van Gelder, 2005). The perfecting of critical thinking requires time, for it is dependent of cognitive development (Kuhn, 1999) and takes place with the appropriation of resources that allow the subject to give a more reflexive and efficient answer to circumstances (Phan, 2010). Furthermore, the relational interaction that takes place in school settings seems to boost the quality of critical thinking; in the relationship with teacher and peers, the student grasps by modeling and receives feedback about his/her activity (Brookfield, 1997).

In this sense, the teacher should be aware of the students' beliefs regarding their skills, analyze how their thinking takes form, and support them to unravel and correct their thinking inaccuracies (van Gelder, 2005). As a matter of fact, in aim of a deeper understanding of

a particular dimension of psychological functioning, it is equally important to analyze both functional and deviant areas. In other words, while trying to ascertain which skills are needed to become more efficient in task accomplishment, it is additionally necessary to discover if any cognitive errors are being made and preventing the fulfillment of one's full potential. In reality, it seems plausible to conclude that the subject might even be equipped with the cognitive aptitudes necessary for an efficient performance but something is stopping him/her from appropriately directing his/her attitude and behavior in order to be successful in the execution of personal and professional daily activity. Therefore, by acquiring knowledge about this kind of obstacle, the subject is given the chance to overcome it (Efklides & Sideridis, 2009).

In an initial phase, this type of thinking requires the subject to learn the theory underlying critical thinking and its specific concepts, which will endure the construction of a metacognitive knowledge base to guide one's activity (Brady, 2008; Carroll, 2005). Data about what and which are critical thinking skills is acquired—namely, comprehension, argument analysis, hypothesis testing, probability consideration, decision making and problem solving—, besides data about how and where they should be used (Halpern, 1998; Kuhn, 1999). In fact, critical thinking is, to some point, distinctive of the surrounding environment, considering that knowledge and skill are employed with deliberation and according to the specificities of contextual circumstances (Bailin et al., 1999a; Brookfield, 1997).

Besides comprising a conceptual understanding in order to emerge, critical thinking needs to be consolidated through training in the classroom and reinforced with examples of possible everyday situations in which such skills can be applied (Ennis, 1993; van Gelder, 2005). The real world must be given as a reference, as well as the decision making that occurs in face of challenges raised on a daily basis (Allen et al., 2004; Rivas & Saiz, 2010). Doing so, it is being made explicit how this type of thinking and resources can become useful and how they should be applied (Saiz & Rivas, 2010).

The possibility of multiple uses of the acquired critical thinking skills is presented as relevant in the literature (Ennis, 1993; Kuhn, 1999; Rivas & Saiz, 2010). If education is exclusively focused on memorization, the prospect of knowledge being transversal and the possibility of transferring critical thinking skills from one area to others where they can be found useful is reduced, particularly in everyday situations where decision making and problem solving are in order (Noddings, 2008; Pithers & Soden, 2000; van Gelder, 2005). Underlying the capacity of transference is the facility to distance oneself from a superficial apprehension of the task at hand, searching instead for its basic structure and applying the previously developed skills (Halpern, 1998, 1999). In short, what seems to be in cause here is the reuse of knowledge. In a society where environmental issues are a hot topic and are included in the speech of worldwide great leaders, cultivating a *green* attitude—characterized by idea recycling and knowledge reuse—seems to be the great goal to be achieved.

Regardless of the assumptions exposed earlier, there is no particular tested model that can be presented as being effective in teaching critical thinking skills (Allen et al., 2004). There has been some debate over whether critical thinking skills have a general nature, or instead, are specific to a subject or field of knowledge (Brookfield, 1997; Kuhn, 1999). On the one hand is presented the hypothesis of curricular infusion, where education is multidisciplinary and focused on teaching both contents of the program and critical thinking skills; on the other hand is the alternative of developing critical thinking in a specific subject, degree course or intervention program, specially designed to its promotion (Allen et al., 2004; Bailin et al., 1999b; Halpern, 1999). Some authors consider the first as the (most) effective format, since the use of critical thinking is sensible to contextual variables; this way, linking different information of the same content, or from distinct areas of knowledge, is facilitated, making it easier to transfer such information to multiple contexts (Bailin et al., 1999b; Kuhn, 1999; Pithers & Soden, 2000).

In regard to teaching strategies, some seem to be more appropriate than others to make critical thinking development viable: direct teaching; modeling; collaborative and/or tutorial learning; presentation of challenges to stimulate the expression of critical thinking; emphasis on a curious and inquisitive attitude towards the surrounding environment; feedback regarding the student's performance along the entire process (Bailin et al., 1999a; Brookfield, 1997; Colucciello, 1999; Noddings, 2008).

Final considerations

The production of knowledge occurs inexorably and at a vertiginous pace, making the ability to discriminate from the available mass of data the information that is relevant, reliable and reusable one of the key-skills to possess (Halpern, 1998). Simultaneously, it is essential to instigate a conscious citizenship, with which each person reveals values that benefit him/her at a personal level and, more important, the community he/she belongs to (Barnes, 2005; Noddings, 2008). The path that makes the development of such an attitude and ability possible seems to be the one of critical thinking, understood as the capacity to make good decisions, i.e., decisions that are grounded and logical (Paul, 2005). In fact, to have and efficiently apply analytical and decision making skills may have a positive impact in people's quality of life (Bruine de Bruin et al., 2007). In this sense, the capacity to think critically is an essential resource for a society one hopes to be a democratic one, made of citizens capable of thinking for themselves and unreceptive to hastily accepting any argument as valid (Brookfield, 1997; Facione, 2010).

The educational system of a number of countries, as well as the scientific production in the area, theoretically characterize critical thinking as a valuable resource and its teaching as one of the missions of today's schooling. Nevertheless, the approaches to this topic are still surrounded by too much abstraction, resulting in the maintenance of a

vague concept that is put into practice only partially and through significant limitations or difficulties. Likewise, there is a diversity of skills that are suggested as characterizing critical thinking and the attached cognitive behaviors, which often result from the divergence of points of view (Bailin et al., 1999b). There is lacking an in-depth study of this area: Transformations to the definition and operationalization of this construct are in need (Phan, 2010; Yanchar et al., 2008), as well as additional efforts to elaborate assessment instruments that are valid and sufficiently comprehensive (Ennis, 1993). Moreover, it is vital to build models that relate critical thinking and learning (styles) (Colucciello, 1999), not only the one occurring in school settings, but also the one brought up in the labor market and other situations of everyday life (Phan, 2010).

Other topics are also insufficiently explored. One of them concerns the ideal moment to start the teaching-learning process of critical thinking skills. Although it is considered that such skills can be precociously widened (Bailin et al., 1999b), still remains to know which developmental stage or school level is the most appropriate to do so, where a reasonable degree of education would correspond to maximum learning. For instance, Ennis (1993) states that critical thinking skills should be taught since childhood; Halpern (1999), on the other hand, asserts that these skills can be taught precociously, but more intentionally during higher education.

Another aspect that would benefit of research concerns the promotion of critical thinking skills in the family context, more specifically the parents' role. Accepting the premise that these skills can (and must) be developed via direct education from the teacher and a proactive attitude towards learning by the student, we can deduct that the parents must also have a role in this equation. Remains to ascertain if merely as mediators who help with homework and hence support the skills that are expected to be developed through the completion of such activities, or as an active part in the process of developing such skills, stimulating them deliberately and according to the attainment of specific goals.

Even if until now we have observed the impossibility of a conceptualization that is broadly accepted by those who focus on the concept of critical thinking, it is essential to give continuity to research and to make efforts towards the development of knowledge in this area. There is lacking an attempt to build an approach both wider and grounded in valid assessment efforts, which is able to contain the diversity of perspectives and characteristics that the myriad of authors associate to critical thinking, as to make dialogue amongst researchers and between these and the education system possible. Such an articulation would be prolific: for the area's advance, for a better quality of the teaching-learning process, for a better adaptation and dynamism in the labor market, but most of all for a life in society characterized by critical reflection and dialogue.

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