

# Critical Thinking and its Importance in Doctoral Education<sup>1</sup>

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## Abstract

**Introduction:** For a doctoral student it is necessary and mandatory to conduct research that leads them to move the frontier of knowledge. In this context, how does critical thinking contribute to generating new knowledge? Many authors attempt to explain and define critical thinking. **Objective:** The purpose of this paper is to discuss the most relevant critical thinking models and to develop a model for this personal attribute in doctoral education. **Materials and methods:** Seminal works and the most significant models of critical thinking were reviewed in the current literature. **Results:** A critical thinking model in doctoral education was developed as an integration of the most important contributions of all authors. **Conclusions:** We argue that there is not a unique definition for this concept and that critical thinking may be understood as a process rather than as a tool, attribute or skill.

**Keywords:** higher education, research institutions

**JEL classification:** I2; I23.

## Pensamiento crítico y su importancia en la educación doctoral

### Resumen:

**Introducción.** Para un estudiante doctoral es necesario y obligatorio llevar a cabo una investigación que lo conduce a mover la frontera del conocimiento. En este contexto, ¿cómo contribuye el pensamiento crítico a generar nuevo conocimiento? Muchos autores intentan explicar y definir el pensamiento crítico. **Objetivo.** El propósito de este trabajo es discutir los modelos de pensamiento crítico más relevantes y desarrollar un modelo para este atributo personal en la educación doctoral. **Materiales y métodos.** Los trabajos seminales y los modelos más significativos de pensamiento crítico fueron revisados en la literatura actual. **Resultados.** Se desarrolló un modelo de pensamiento crítico en la educación doctoral, como una integración de las contribuciones más importantes de todos los autores. **Conclusión.** Argumentamos que no existe una definición única para este concepto y que el pensamiento

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crítico puede ser entendido como un proceso más que como una herramienta, atributo o habilidad.

**Palabras clave:** programa de enseñanza, enseñanza científica superior, doctorado

## O Pensamento Crítico e sua Importância na Educação de Doutorado

### Resumo:

**Introdução.** Para um aluno de doutorado é necessário e obrigatório realizar uma investigação que o leve a mover a fronteira do conhecimento. Neste contexto, como o pensamento crítico contribui para gerar novos

conhecimentos? Muitos autores tentam explicar e definir o pensamento crítico. **Objetivo.** O objetivo deste trabalho é discutir os modelos de pensamento crítico mais relevantes e desenvolver um modelo para este atributo pessoal na educação de doutorado. **Materiais e métodos.** Trabalhos seminais e os modelos mais significativos de pensamento crítico foram revisados na literatura atual. **Resultados.** Um modelo de pensamento crítico na formação de doutorado foi desenvolvido como uma integração das contribuições mais importantes de todos os autores. **Conclusões.** Nós argumentamos que não existe uma definição única para esse conceito e que o pensamento crítico pode ser entendido como um processo e não como uma ferramenta, atributo ou habilidade.

**Palavras-chave:** currículo, ensino superior ciência, Ph.D.

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## Introduction

Critical thinking is a subject of growing interest nowadays. It has different definitions described by various authors based on terms of theory and pedagogy. Regularly the way one thinks and the process of thinking have been established in our minds by habit or routine, and the process that develops in our brains when people think is not clear for us. The current situations present in the world, the problems people must face and the way people have changed need a different way of thinking: now people must be more analytic, capable of controlling themselves, of rethinking, relearning and reevaluating continuously, more flexible and more investigative. According to Brookfield (1987), critical thinking is a process that involves emotional and cognitive dimensions contained in a particular context and culture. Besides, as Watkins and Earnhardt (2015) explained, critical thinking is not just a complex

process but rather it is considered as a set of competencies, skills, and behaviors that can be systematically developed. Therefore, it can be said that critical thinking is a set of skills that can be learned through specialized education. This is why, starting from the review of seminal works and reviewing the most critical models of critical thinking in the literature, this paper aims to integrate the definitions of the most important authors and proposes a model that allows establishing the importance of critical thinking in doctoral education. We argue that there is not a single definition for this concept and that critical thinking may be understood as a process rather than as a tool, attribute or skill.

## Materials and methods

Seminal works and the most significant models of critical thinking were reviewed in the current literature. Specifically, the main

articles using “critical thinking” and “doctoral education” as keywords were reviewed. Therefore, the review was limited to those works that, in some way, relate critical thinking with doctoral education. This literature review was carried out by consulting mainly two databases: Thomson Reuters ISI and Elsevier Scopus. These terms were chosen because they correspond to the variables within the research idea and, also, they are keywords in most papers on the subject. In addition, to support the research idea, some books about critical thinking in education were also consulted.

## Discussion

Firstly, to understand what critical thinking is, it is necessary to define the misconceptions about critical thinking. Sometimes, critical thinking is related to a skill which is a term used in a variety of contexts and senses but it will be used to specify that a person is capable of or talented in any activity or task. “Conceiving critical thinking as a skill in this sense implies more than simply considering an individual is a competent or proficient thinker. It is based on a conception of skill as an identifiable operation which is generic and discrete” (Bailin, Case, Coombs, & Daniels, 1999a, p.270).

In this sense, some actions and tasks are generic and are easy to study and learn by themselves. These activities are fundamental, and they are separate from a particular knowledge area, and can be applied in diverse situations (Davies, 2013). The argument that critical thinking skills are generic affirms that it is possible to implement these skills in any situation even if you do not have prior knowledge of the action field. In this sense, Bailin *et al.* (1999a) suggested that this argument could be false because background knowledge in a specific area is a prerequisite for developing critical thinking. For instance,

one cannot resolve an algebra exercise if one does not have knowledge about math because it would be impossible to analyze the causes and consequences of the situation.

From this perspective, it is assumed that to gain a skill it is necessary to involve processes or procedures and that if a person becomes an expert in these processes, he or she will turn out to be proficient in that skill. This argument allows to analyze critical thinking as mental processes. Commonly, in the study of critical thinking, it is assumed that being good at a particular mental process guarantees being skilled at critical thinking. In the spirit of Bailin *et al.* (1999a), these procedures include such things as classifying, inferring, observing, evaluating, synthesizing, and hypothesizing. These mental processes are differentiated by distinguishing among results (Nickerson, Perkins & Smith, 1985).

Also, critical thinking is known as being related with following steps, stages, or procedures (Brookfield, 1987). It is commonly believed that a student who has learned how to follow procedures will develop his or her critical thinking. This claim is not entirely true because it cannot be guaranteed that a person who knows how to follow procedures will have critical thinking about a topic or situation. Being a critical thinker involves continual assumptions, but it cannot be defined or determined by a static process or a finished method. “The performance of tasks such as thinking of reasons for and against a position, or brainstorming alternatives, does not guarantee that an individual is thinking critically” (Bailin *et al.*, 1999a, p. 278).

As has been seen, critical thinking has many definitions. It has been equated with the development of logical reasoning abilities, with the application of reflective judgment, with assumption hunting, and with the creation, use, and testing of meaning (Paul & Elder, 2002).

According to these authors, it is an art that, conducted with discipline, allows one to choose the best options regarding any circumstance. However, there are other aspects to consider with respect to critical thinking; for example, when a person is thinking in a lean way, it could be claimed that it is not thinking critically. In a global definition, critical thinking can be understood as the quality of the thoughts a person has and the way they develop different processes based on those ideas, and the decisions made also based on those thoughts.

It is the quality of the thinking, not the processes of thinking, which distinguishes critical from uncritical thinking. Usually, there are some activities related to critical thinking; problem-solving is one of them, and it is not always involved with critical thinking. Like decision making, one can develop these activities and not be thinking critically. On its part, creativity is more related to critically thinking, and many researchers consider that creativity is a fundamental aspect at the moment of thinking critically (Lee, 2008). Critical thinking often requires imagining possible consequences, generating first approaches, and identifying alternative perspectives (Bailin *et al.*, 1999b).

The capacity to imagine and create different alternatives and solutions, and evaluate them in the context is an essential skill that a critical thinker should have (Weisberg, 2006). This condition would allow us to innovate, have different ideas, interpret different situations, and explore new alternatives to create the best solution. Because critical thinking is considered as a high standard way of thinking, it is necessary to describe which these standards are to manage to be a critical thinker. In this sense, the critical thinker is not a person who can develop psychological processes or has mental capacities, but there are undoubtedly some activities or habits that a critical thinker

should be able to develop or should have.

According to Kirby and Kuykandall (1991), each situation and each context require different activities and a different way of thinking; the critical thinker must be able to do such things as to judge the adequacy of reporting definitions and detect invalid arguments, and must be able to accomplish these tasks successfully. Also, another way to define or describe a critical thinker is making a description that includes the intellectual properties that they must have. Bailin *et al.* (1999b) stated that intellectual resources are of five kinds: background knowledge, operational knowledge, knowledge of critical concepts, heuristics and habits of mind.

The first intellectual resource, *background knowledge*, is critical because the quality of thinking a person can do depends on what he or she knows or can find out about the topic or problem. On the other hand, a problem or a situation always happens in a particular context, made of arguments, consequences, causes, practices, and opinions, which makes knowing this context and having a knowledge of it determinant to think critically about the specific situation.

The second intellectual resource, *operational knowledge*, is the operational level of the standards. This one is vital in critical thinking because this operational knowledge is what is going to give a person the basis to make decisions, solve problems, and take stances based on critical thinking.

The third intellectual resource is *knowledge of key critical concepts*, which refers to being good at critical thinking; it is crucial to differentiate the quality, the precedence and the use one can give to information that is given to one. A critical thinker should be able to identify if the information is valuable and should be able to

use this information in the best way for solving a problem or facing a particular situation.

*Heuristics*, the fourth intellectual resource, refers to strategies and procedures designed so that people can carry out all types of tasks in a specific place.

The last intellectual resource, *Habits of mind*, refers to having developed or established the sources mentioned before in one's mind, which does not guarantee success as a critical thinker. For being successful in this process, the person has to develop a commitment to oneself and the information. Also, a humble position has to be assumed to respect productive performances and high-quality products. Moreover, an inquisitive attitude is necessary to analyze and study the arguments and the information given by the critical thinker. On the other hand, it is determinant to be open-minded; a critical thinker cannot be as a referee of the information provided in your studies. It is important to be neutral, to avoid bias, and guarantee the transparency of information. Moreover, finally, a critical thinker should work with ethics and respect; respect for others, for the information, and for the legal authority.

Several authors have studied critical thinking from different approaches. More than 25 years ago, Brookfield (1987) raised the importance of critical thinking in people to achieve social development. For this author, "Critical thinkers are actively and engaged with life. They see themselves as creating and re-creating aspects of their personal, workplace, and political lives" (Brookfield, 1987, p.381). In this context, the definition of critical thinkers proposed by this author differs from the one suggested by Bailin *et al.* (1999b). Brookfield (1987) described critical thinkers as more humanized, and with a lot of soft skills, and describes critical thinking as related to the type of personality and personal qualities of the individual. He also suggested

that critical thinking is an emotional as well as a rational process, and it places emotions central to the critical thinking process. In consequence, emotions like joy, relief, release, anger, and exhilaration are determinant in the process of critical thinking (Brookfield, 1987).

"The educational goal must be to teach them to do such tasks well by increasing their capacity and inclination to make judgments by reference to criteria and standards that distinguish thoughtful evaluations from sloppy ones" (Bailin *et al.*, 1999a, p.279). In this context, doctoral students are called to generate new knowledge, and they will be scholars and future leaders through the generation of valuable and high impact knowledge. Indeed, they need to be critical, proactive, and creative thinkers (Brodin, 2016). For this reason, during their educational process, it is determinant to give them the tools and the actions they can use when they are facing situations that require thinking. It is relevant that they can know how to use their minds in the best way possible, how to choose among their thoughts, how to be critical, and how they can analyze the situations to make the best decisions.

More recently, Paul and Elder (2002) pointed that one of the most important things one can do for oneself to begin the process of becoming a "critic" of one's thinking is to pay attention to your thinking, to learn how to be a critic and how to analyze it. It is vital to observe the way one thinks. How easy does one learn? How critic is one with the thinking? How much time does one spend thinking vague thoughts? Can one differentiate when thinking well and when not? When one starts to analyze these questions, one will find out how acquainted one is with critical thinking.

Moreover, now the person will be conscious of the process of thinking that develops in its mind when facing a situation. It will help to

exploit one's potential, reduce errors, innovate, and discover new ideas and options. As a result, it is possible to resolve and do new things to train oneself to think to be critical and to maximize the quality of the way one thinks.

In their seminal work *Critical thinking: teaching students to seek the logic of things*, Paul and Elder (1999) indicated that a critical thinker must develop the following eight elements of reasoning: (a) purpose of the thinking, (b) question at issue, (c) information, (d) interpretation and inference, (e) concepts, (f) assumptions, (g) implications and consequences, and (h) points of view. According to Paul and Elder (2002), thinking itself is not a difficult exercise, in fact, it is a natural process in which people do not spend much energy, and the process of thinking is something natural in humans and is something that is easy for all of us. However, the fact of thinking with better quality is something difficult for all of us still and, for this reason, it is important that we can discover which are our habits involved with the process of thinking. Also, people must be capable of changing those that are not adding value to the quality of their thoughts, and gain significant superiority in the process.

For these mentioned authors, another factor that must be considered for the study of critical thinking is the essential functions of the mind: thinking, wanting, and feeling. It is determinant to know the way our mind relates these three functions to understand how the process of thinking develops in the three cases because they are correlated, and each is all the time influencing the other two of them. In this sense, Paul and Elder (2002) stated that a good way to understand the working of the mind is considering all have a subconscious connection with it, for the understanding of this relationship leads to greater control of our emotions.

In sum, critical thinking is an excellent and practical tool which, accompanied with commitment and the fair use of both resources and intellectual standards, will provide a progressive improving in the quality of our lives, jobs, and the way we face the different situations. The adaptation of this kind of thinking could also save us time, energy, mistakes, rework, and could make us better thinkers to improve the power of our mind and thoughts.

## Results

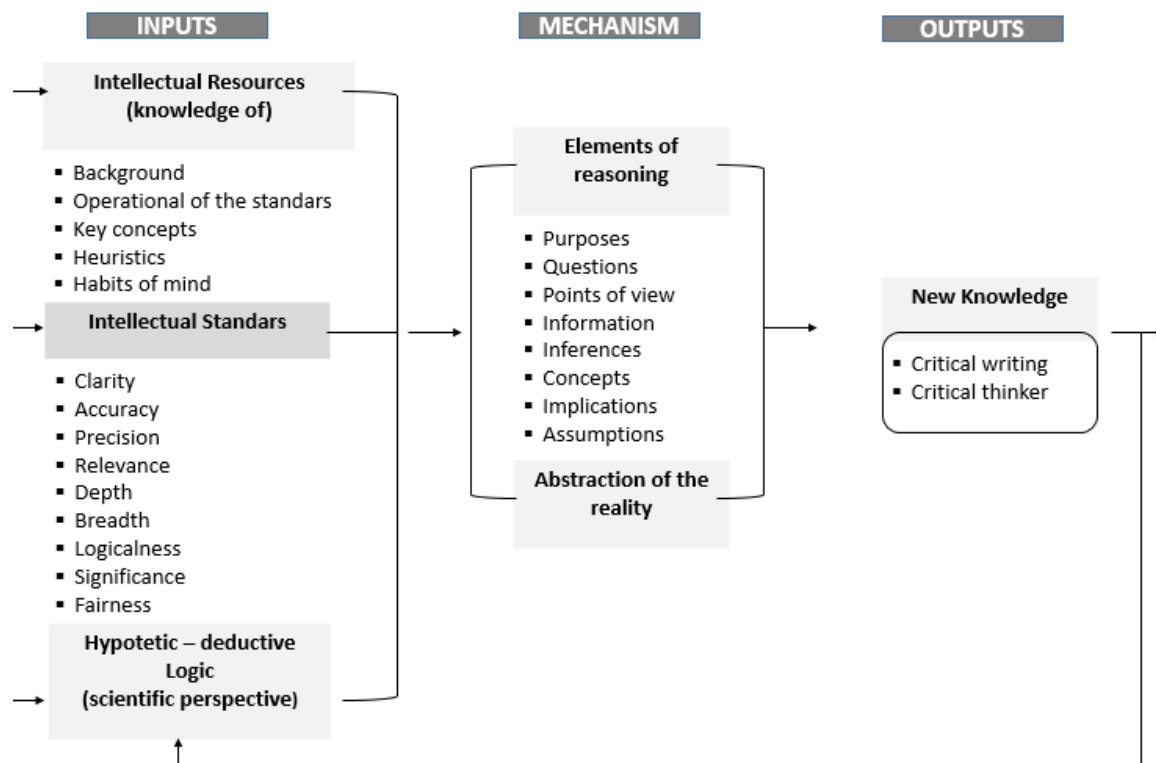
Up to this point, this article has discussed some important approaches to the study of critical thinking. Based on these concepts and definitions it will attempt to develop a model of critical thinking in doctoral education because the influence of critical education is unyielding in academic settings (Murray, 2011) and "Critical and creative thinking constitute important learning outcomes at doctoral level across the world" (Brodin, 2016, p.971). However, the most significant result for a critical thinker is critical writing (D'Alessio, 2010).

To this end, it is necessary that the doctoral student develops the ability to think systemically, in an orderly, critical and creative manner. So, the new knowledge generation should be thought scientifically because the theorizing act is essential (Eikmeyer, 2007). In this context, Figueroa (2012) noted that generating scientific knowledge in the field of social sciences requires an analysis process based on the method of abstraction, and to consider all variables can be a complicated exercise. In his book, *The alpha-beta method*, he presented a particular method which is derived from Popper's theory of knowledge which is a useful tool that all doctoral students should follow to produce scientific knowledge.

Finally, in an attempt to integrate the most

important contributions of all authors that have been presented in this essay, Figure 1 shows a critical thinking model in doctoral education,

given that, as mentioned above, a doctoral student would be a critical thinker.



**Figure 1.** A model of critical thinking in doctoral education

Source: adapted from D’Alessio (2010); Bailin, Case, Coombs & Daniels (1999a; b).

## Conclusions

Critical thinking is a process that, like any process, receives inputs that are transformed through a mechanism which, for the case of doctoral education, consists in making use of the elements of reasoning and in achieving a certain level of abstraction from reality, to finally generate results (outputs). These results are the generation of new knowledge and that of critical thinking, indispensable characteristics of a doctoral student. In short, and without the courage to ignore the contributions of different authors, critical thinking is understood as a process rather than as a tool, attribute or skill.

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