ON DEVELOPING CRITICAL THINKING:
A narrative overview

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Abstract

This study provides an overview on the contextual factors, educational practices and teaching methods that develop critical thinking on students. To provide this overview, we synthesized the meta-analysis and reviews of studies published between 1940 and 2017. For outlining the contextual factors, we present the three levels that promote or inhibit critical thinking: (1) institutional level, (2) teaching level, and (3) course level. We further synthesized the literature on educational practices that develop critical thinking and outline the teaching methods from three categories: (1) oral (e.g., debate, dialogues etc.), (2) written (e.g., debate, dialogues etc.), and (3) applied (e.g., experiential learning, problem solving etc.). This literature review study provides theoretical implications for the literature on critical thinking. These implications consist of an overview of the contextual factors, educational practices and teaching methods that develop critical thinking.

Keywords: critical thinking, narrative and review, theoretical perspective.

Introduction

One of the most outstanding concept of the 21st century, critical thinking (CT), is highly debated and discussed in research (Bonney & Sternberg, 2011; Care, Griffin, & McGaw, 2012). The importance of this concept comes from the practical applicability of CT skills (Ennis, 1989; Halpern, 1998). For instance, being a critical thinker helps you in processes such as acknowledging the misleading information and making decisions accordingly. Thus far, the main focus was on finding a conceptual definition that explains CT, while the operational definition was overlooked, creating specific hinders for a practical approach of CT. Due to the general lack of a consensus on an operational definition and the specific components of CT (dispositions, skills, knowledge), there is a continuous debate about specific teaching methods that develop CT (Moeti *et al.*, 2017). Over the years various researchers

defined the CT concept from different perspectives, including CT as disposition of the ideal critical thinker, or CT as a set of particular skills of a critical thinker. In addition, CT definition comprises knowledge, skills and dispositions of a critical thinker. (Ennis, 1987; Facione, 2000; Kurfiss, 1988; Lipman, 1991; Paul & Binker, 1990; Siegel, 1988; Willingham, 2008). Despite the reiterated idea that there is a lack of agreement about the theoretical definition of CT, a large research project conducted to the development of a shared theoretical definition (i.e, Delphi Research Project; Facione, 1990). The Delphi Research Project (1988-1989) involved forty-six leading experts from different domains and interests with strong ties to CT research, with the aim of defining and agreeing on CT and its components. This group of leading experts defined CT as the judgment that has the characteristics of purposefulness and self-regulatoriness. Further, CT comprises cognitive skills such as inference, analysis, evaluation, self-regulation, interpretation and explanation and affective dispositions such as inquisitiveness regarding issues, concerns on being generally well-informed, open-mindedness and flexibility regarding different perspectives, understanding of individual opinions, honesty in dealing with individual stereotypes, biases or egocentric tendencies, clarity in expressing questions or concerns, etc. (Facione, 1990).

This study aims to present the overall development of CT. This includes presenting and detailing the contextual factors that promote or inhibit CT on distinct levels, the educational practices and the teaching methods for developing CT.

Methods

For this study, we conducted a narrative review. This approach is suitable due to the aim of outlining the established teaching methods for developing CT. A narrative review consists of an unsystematic search of the literature referring to a specific topic that is further synthesized in one comprehensive study (Green *et al.*, 2006). This supported the overall aim of the study due to the broad perspective that is presented, allowing a historical description on the CT topic. We aimed to establish which are the teaching methods that are proven to develop CT. In order to establish that, we first investigated the contextual factors that influence CT development. We added a course approach to teach CT (Ennis, 1989) and instructional approach with positive effect over CT outcomes (Abrami *et al.*, 2015); Afterwards, we considered the key studies such as meta-analysis and systematic reviews, that gathered articles published between 1940 and 2017. We depicted their findings in a table that summarizes the educational practices (Table 4) in order to offer a broad overview on teaching methods that develop CT (*based on Bezanilla et al., 2019; Dumitru et al., 2018 and Tiruneh et al., 2014; findings*). Finally, in order to accomplish our aim, we investigated the studies that formed the basis for the previously investigated meta-analysis and reviews. That fulfilled our aim to present the teaching methods that develop CT in a comprehensive manner (Table 5).

Contextual factors that promote or inhibit Critical Thinking

Elen *et al.* (2019) proposed an educational protocol that included contextual factors that promote or inhibit CT development. These contextual factors refer to three distinct levels (i.e., institutional level, teaching level and at the course level). The *institutional level* refers to the mission of the institution that has to have a declared aim of developing CT and its accomplishment (i.e., regular debates, freedom of students and university teachers in expressing themselves regarding institutional aspects that they agree or disagree with). The *teaching level* has to have a description of CT and how the development of CT can be reached through the program. In the *course level* the CT has to be mentioned as a learning outcome, and specific objectives for this resulting outcome have to be stated. These contextual factors have applicability in the organizational culture of university actors such as administrators, decision makers, university teachers and students.

CT is promoted at all the three levels discussed previously. At the institutional level, university actors have to establish their institutional mission around the CT focus and support such mission with promotion and rewards alongside a quality control system for teaching programs that support CT development. Activities on institutional level include group discussion on university teachers level on teaching, social service and research that supports CT development with shared aims and tasks (Elen et al., 2019). At the teaching level, the focus moves on curriculum. A curriculum can be seen as a system, process, content of instruction, realm of meaning, discourse and application of reason (Jorgensen, 2002). Moreover, curriculum viewed as a result of schooling and experience of every individual learner, refers to the content (a set of subjects) together with a set of materials, guided by a set of performance objectives, that is taught inside and outside of school (Marsh, 2009). For supporting CT development on the teaching level, the curriculum has to be designed accordingly. Specifically, all the teaching has to be centred on students and their learning needs that have to include critical thinking development. At the course level the focus is on teaching methods. Specifically, a university teacher who is a critical thinker has to use active teaching, to offer guidance and support for students to use their CT skills for generalizing and transferring the acquired skills and knowledge to different contexts. In the same course level, university teachers have to promote an open attitude towards failure and acknowledgement of failed aspects and their causes.

At the same three levels, CT development can be inhibited. At the institutional level, the main inhibitory factor is the hierarchical organizational culture with decision-making on the top management level and applying such decisions on subordinate levels. Such hierarchical organisational culture promotes the lack of freedom of expression and lack of professional development and possible discussion about CT. This further promotes obedience, individualism and narrow thinking, resulting in an inhibitory context for CT development. At the teaching level the inhibitory factor consists of a specific curriculum lacking the support for CT deve-

lopment. Specifically, such a curriculum would focus on memorizing and reproducing contents. The teaching would imply a major CT inhibitory factor namely, the orientation solely on the content. At the course level, the inhibitory factors refers to the specific behavior of the university teacher that is acting as the infallible expert, knowing everything and not being able to fail and the specific behavior of university actors that do not accept the possibility of their failure and the possibility of rethinking their thoughts. Consequently, accepting the ideas of others without hesitation or any reasoning inhibits the development of the university actor as a critical thinker. Table 1 summarizes the contextual factors that promote or inhibit the CT development according to each of the levels.

Table 1: Contextual factors that promote or inhibit CT (Elen et al., 2019)

Level	Factor that promote CT	Factor that inhibit CT
Institutional level	regular organization of debates	hierarchical organization culture where university teachers and students are executing the decisions taken on top
	freedom of expression for students' and teachers'	lack of free expression
	position-taking and argumentation	taking over others' idea
	the mission of the institution that explicitly refers to CT	no institution interest that refers to CT
	a promotion system that rewards and recognizes CT	a promotion system that promotes obedience
	quality control system that search for factors to promotes CT and open-mind thinking embedded in teaching programs	factors that encourages obedience or narrow thinking
	initiate and organize professional development for discuss about CT in teaching, social services and research level	ignore the professional development and possible discussion about CT
	teacher design teams that ensure team interaction as an open atmosphere, shared feeling of responsibility, and support; ensure shared goals; provide a team coach that ensure recognition of different tasks	encourage individualism and close atmosphere
	argumentation for decisions openly communicated	no proof for any decisions taken
Teaching level	curriculum that foster CT	curriculum that does not sustain CT

Level	Factor that promote CT	Factor that inhibit CT
Course level (related to classroom)	centered learning on student (learning oriented)	teaching centered (content oriented)
	ideal CT instructor that support students to engage their CT skills into transfer and generalization process to many contexts	teacher behavior as infallible expert
	active teaching	teacher lecture
Course level (related to classroom and daily-life)	openness for failure	avoidance the failure through acceptance and adoption of (others') ideas as granted

Ennis's approaches to teaching Critical Thinking

Another significant effect on developing CT comes from the course approach (Abrami *et al.*, 2008). Specifically, Ennis (1989) proposed a CT course approach with a classification and description of the courses. Four main course approaches are considered in the context of CT: *general*, *infusion*, *immersion* and *mixed* (see Table 2). In the *general* approach, CT skills and dispositions are treated as critical course objectives, independent of the subject of the course. Specifically, CT objectives are not directly communicated to students. Students are aware of the course requirements without mentions of the CT objectives. On the opposite side, for *infusion*, *immersion* and *mixed* approach, the focus is on the content of the course. Specifically, in the *infusion* approach, the objectives are made explicit to the student and the content of the course is important for supporting the CT (e.g., some courses are more content-intensive, such as courses related to social sciences). In the *immersion* approaches, CT is an implicit objective, and the teaching is thought-provoking with the student immersed in the subject. Furthermore, *mixed* approach consists of a combination of *general* approach with the *infusion approach* or the *immersion* approach, where CT is taught separately from the subject matter (i.e., specific course topic).

Table 2: Ennis's approach to teach CT (1989)

CT -> approaches	GENERAL	INFUSION	IMMERSION	MIXED
Objectives are --->	CT skills and dispositions (implicit)	CT (explicit objectives)	CT (implicit objectives)	CT objectives are independent from other course objectives
Content is --->	no specific subject matters	the specific subject content (course) is important		
Teaching CT skills and dispositions is --->	separated from the content course	deep, thoughtful and well understood, integrated in the subject matter teaching	thought-provoking and integrated in the subject matter	specific for the subject matter
CT general principles are --->	made explicit		made implicit	explicit in a separate course

Instructional approaches for different Critical Thinking outcomes

We further present the Abrami's *et al.*, (2015) instructional approaches that expanded the analysis beyond Ennis's approaches to teaching CT. The main categories for the instructional approaches identified here consist of individual study, dialogue, authentic or anchored instruction and mentoring or coaching. *Individual study* includes different learning activities and instructional techniques (e.g., reading and listening to the teacher's explanations, reflecting on information and solving abstract problems). *Dialogue* in any form, oral or written, includes learning through discussions and various activities (e.g., one-on-one interactions, critical dialog, cooperative and adversarial dialogue). The subcategories related to the dialogue consist of asking questions, group or class discussions, Socratic dialogue, formal debate and student presentation with follow-up discussions. *Authentic* or *anchored instruction* includes well defined real-world problems. Exemplar activities consist of presenting genuine situations that engage and stimulate students to ask questions. The sub-category of authentic or anchored instruction includes simulations, role-play, case studies, applied problem solving. The *mentoring* category includes tutoring, coaching, one-on-one modeling or apprenticeship. Table 3 further presents the main instructional approaches identified in the reviewed literature.

Table 3: Instructional approach with positive effect over CT outcomes according to Abrami et al. (2015)

Category	Includes	Organization/activity	Sub-category
Individual study (studying alone)	instructional techniques; learning activities	reading and listening the teacher's explanations, reflecting on information, solving abstract problems	individual study
Dialogue (oral or written)	learning through discussion	one-on-one interactions; adversarial dialogue; cooperative dialogue; critical dialog (whole class debates/ discussions; within-group debates/ discussions; online discussion forums)	asking questions (by teacher or by students); group/ whole class discussions; Socratic dialogue; formal debate; student presentation with follow-up discussion
Authentic or Anchored Instruction	well defined real-world problem	presentation of genuine problems to engage and stimulate students to inquire	simulations; role-play; case studies; applied problem solving
Mentoring or coaching	one-on-one modeling/ apprenticeship; tutoring; coaching	one-on-one mentoring interaction between an expert and a novice	one-on-one teacher-student interaction; peer-led dyads; internship (experienced coaching a younger colleague)

Educational practices for developing Critical Thinking

Educational practices comprise the teacher's understanding of the nature of knowledge and the role of students in acquiring this knowledge during teaching and classwork (Elmore, 1996). In the following, we will present the investigated studies (i.e., meta-analyses and reviews) that analyzed the literature on educational practices for CT development, published between 1940 and 2017. Table 4 presents the main findings and the key contributions to CT development from the studies focused on educational practices.

Table 4: Empirical studies that analyzed the educational practices that develop CT

Authors / type	Years analyzed	Findings	What contribute to develop CT
Kennedy et al., (1991); review	1939-1990	- CT skills can be either specific or nonspecific to disciplines; - CT should be taught separately or in the same subject area; - CT skills are or are not generalized thinking skills; - CT skills can be or cannot be taught and transferred to other domains; - CT skills and dispositions can be taught at any age (respecting the peculiarities of the age); the biggest gain in CT were founded on freshmen; - teachers need to be trained in CT skills and dispositions in order to be well prepared to teach CT	- recitation and discussion; - approaching of real-world problems within exercises; - group work, cooperation and higher-level cognitive questions from the teacher; * there was a lack of empirical research demonstrating the most effective approaches for developing CT;
Gellin (2003); meta-analysis	1991-2000	CT scores are higher for students involved in organizations and clubs, living lives in campus and in a continuous interaction with experienced peers	multiple perspectives and points of view that encourage to reevaluate their prior opinions
Ten Dam & Volman (2004); review	1990-2000	- CT should be taught as the aim of education; - CT, higher order ability and competences can be increased by cooperative learning and group discussion; - interdisciplinary approach brings greater gains in CT; - the instruction and out-of-class experiences brings contributions to gains in CT; - constructivist learning environment enhances CT; - CT can be develop in a social constructivism approach to learning	- discussions; - dialogues; - fish bowling; - the creative controversy model and academic controversy in cooperative groups; - small group teaching; - promoting inquiry; - designing situations where students make inferences
Abrami et al., (2008); meta-analysis	1960-2005	- the following instructional type of intervention has a significant effect on developing CT skills and dispositions: mixed, infusion, general and immersion; - the pedagogical significant grounding is: instructors' training, extensive observations, detailed curriculum description and CT as one of the course objectives; - the student collaborative learning condition in interventions influences the CT development;	explicit CT (skills) objectives in courses

Authors / type	Years analyzed	Findings	What contribute to develop CT
Behar - Horenstein & Niu (2011); review	1994-2009	- using the same instructional interventions leads to different results; - immersion is the most used instructional approach	- concept mapping; - scenario-based course exercises; - active learning techniques; - problem-based learning; - inquiry-based learning; - question approach; - guided practice; - computer-assisted instruction
Niu et al., (2013); meta-analysis	1994-2009	student discipline and treatment length are predictors of effect size on CT skills gains	instructional interventions (classroom teaching) are effective on influencing CT development
Tiruneh et al., (2014); review	1995-2012	- teaching strategies (where CT principles are explicit or implicit) and instructional approach are effective in influencing CT instruction; - direct teaching strategies are more effective in improving CT; - infusion and immersion are the most used approach in CT instruction; - general, mixed and infusion approach reported a significant CT improvement; - there are no gender difference in CT gains	- teacher modeling; - scaffolding; - role playing; - small group discussions
Abrami et al., (2015); meta-analysis	2003-2009	specific pedagogical interventions are associated with gain on CT scores; there are effective strategies (e.g., dialogue, mentoring and exposure to authentic examples or problems) to teach CT skills and dispositions	CT can be taught through discussions, authentic situations and mentorship
Dumitru et al., (2018); review	2000-2017	- the most used type of intervention in developing CT are: self-study, dialogue, authentic situations, mentoring and experiments; - infusion and immersion are the most commonly adopted CT instructional approach	- lecture discussion teaching; - argumentation and peer review; - problem-based learning (inquiry)

Teaching methods for developing Critical Thinking

Teaching methods consist of principles, strategies or procedures used by teachers in order to achieve the course objectives (Westwood, 2008). The reviewed literature illustrated the effective teaching methods to develop CT. Table 5 presents the effective teaching methods presented in the investigated meta-analyses, reviews and empirical studies. Three main categories of activities are presented to capture the specificity of the teaching methods: (1) oral, (2) writing, and (3) applied.

Table 5: Overview of the teaching methods that develop CT

Activities	Methods		Authors
ORAL	debates		Abrami *et al*. (2015); Arslan *et al*. (2014); Dumitru *et al*. (2018); Duron *et al*. (2006); Espindola Castro (1996); Islas Torres *et al*. (2010); Marin-Calderon (2014); Plath *et al*. (1999); Tsui (2002); Walker (2003)
	oral argumentation, dialogue, group discussions, lecture discussions		Allegretti & Frederick (1995); Chau *et al*. (2001); Chen *et al*. (2011); Daud & Husin, (2004); Dumitru *et al*. (2018); Elliot *et al*. 2001; Garside (1996); Halpern (2014); Huff (2000); Kumta *et al*. (2003); Magnussen *et al*. (2000); Makhene (2017); Piergiovanni (2014); Plath *et al*. (1999); Reed & Kromrey (2001); Semerci (2006); Sendag & Odabasi (2009); Stark (2012); Szabo & Schwartz (2011); Walker (2003); Yang *et al*. (2008); Yeh (2009); Yuan *et al*. (2008)
	interviews		Bahr (2010)
	questions	teacher's questions	Abrami *et al*. (2015); Arslan *et al*. (2014); Duron *et al*. (2006); Gasca Jimenez (2017); Hawes (2003); Marin-Calderon (2014); Piergiovanni (2014); Thompson (2011); Walker (2003)
		enquiries / questioning	Barnet & Francis (2012); Duron *et al*. (2006); Halpern (1998; 2014); Lopez Aymes (2013); Magnussen *et al*. (2000); Renaud & Murray (2008); Toy & Ok (2012); Walker (2003); Williams *et al*. (2004)
	oral presentations	presentations or speeches given by students	Arslan *et al*., (2014); McLean & Miller (2010)
		lectures given by teachers, teacher modeling, coaching, explicit teaching of CT skills	Anderson *et al*. (2001); Allegretti & Frederick (1995); Alwehaibi (2012); Bensely & Haynes (1995); Bensley *et al*. (2010); Marin-Calderon (2014); Mazer *et al*. (2007); McLean & Miller (2010); Nieto & Saiz (2008); Reed & Kromrey (2001); Solon (2007); Williams *et al*. (2004); Yeh (2009)
	feedback, tutor guidance		Dumitru *et al*. (2018); Duron *et al*. (2006); Islas Torres *et al*. (2010); Kromrey (2001); Magnussen *et al*. (2000); Nieto & Saiz (2008); Plath *et al*. (1999); Reed & Kromrey (2001)
WRITING	writing assignments argumentative, essays and reports		Arslan *et al*., (2014); Bahr (2010); Duron *et al*. (2006); Espindola Castro (1996); Gasca Jimenez (2017); Hawes (2003); Laiton Poveda (2010); Lopez Aymes (2013); Makhene (2017); Marin-Calderon (2014); Piergiovanni (2014); Tsui (2002); Walker (2003); Wilson (2015)

WRITING	concept map and argument mapping		Chen *et al.* (2011); Dwyer *et al.* (2011, 2012); Halpern (2014); Wheeler & Collins (2003)
	diary	practical activities followed by written reflection	Duron *et al.* (2006); Piergiovanni (2014)
APPLIED	experiential learning		Duron *et al.* (2006); Franco *et al.* (2017); Piergiovanni (2014)
	experiential based - connecting student's own experience with life situations		Dumitru *et al.* (2018) ; Marin-Calderon (2014); Alwehaibi (2012); Nieto & Saiz (2008)
	civic engagement		Ahrari *et al.* (2016)
	simulations		Hawes (2003)
	cooperative/collaborative work		Arslan *et al.* (2014); Gasca Jimenez (2017); Loes & Pascarella (2017)
	drama	role playing, creative drama	Uzunoz and Demirhan (2017); Chau *et al.* (2001); Toy & Ok (2012)
	problem solving	project about a concrete issue; problem-based learning	Dumitru *et al.* (2018); Duron *et al.* (2006); Facione (2007); Laiton Poveda (2010); Piergiovanni (2014); Tsui (2002); Semerci (2006); Sendag & Odabasi (2009); Yuan *et al.* (2008)
		everyday issues; case study	Abrami *et al.* (2015); Bahr (2010); Espindola Castro(1996); Grohs *et al.*, (2018); Halpern (2014); Hawes (2003); Loopez Aymes (2013); Nunnez-Loopez *et al.*, (2017); Olivares Olivares & Heredia Escorza (2012); Saiz Sanchez & Fernandez Rivas (2012); Toy & Ok (2012)
		projects	Gasca Jimenez (2017); Thompson (2011)
		solving ambiguous situations; ill-structured problem	Arslan *et al.* (2014); Halpern (2014); Semerci (2006); Sendag & Odabasi (2009)
		peer-based critique exercises; pair-work to solve a problem; peer and self-evaluation	Anderson *et al.* (2001); Angeli & Valanides (2009); Arslan *et al.*, (2014); Mazer *et al.* (2007)
		activities to review the media	Bahr (2010); Gasca Jimenez (2017)

Note: Developed based on Bezanilla et al. (2019, Table 1, p. 4)

To sum up, we can observe that oral methods have the highest frequency, followed by applied and writing methods. These results align with the constructivist and social constructivist approaches, where interaction represents the key point for

developing CT. The constructivist approach describes learning as a natural activity of the human brain. Moreover, human learning is active, happens naturally, and it builds knowledge. On the other hand, social constructivism represents the social approach to constructivist learning, describing how knowledge is obtained from the social interactions between individuals (Tracey & Morrow, 2017).

Discussion

This study aimed to provide an overview on CT development, building on meta-analysis, reviews and empirical studies. This further consists of presenting four main topics related to CT development (i.e., contextual factors that promote or inhibit CT development, teaching or instructional approach, educational practices and teaching methods for CT development).

Developing CT requires more than applying some specific teaching methods. The literature revealed some additional factors that influence the CT development (Elen *et al.,* 2019). If we see CT as a core point of education, there are factors that stimulate or inhibit CT at the course level, teaching level and institutional level.

Thus far, the course approach is the closest factor that can influence CT. Thereby, we further presented Ennis's course approach to teach CT in a general, infusion, immersion or mixed way. Moreover, it required the addition of the perspective on instructional approaches that lead to positive effect over CT outcomes. Beyond Ennis's approach, Abrami (*et al.*, 2015) proposes an instructional approach with four categories: individual study, dialogue, authentic or anchored instruction and mentoring or coaching.

Educational practices is one of the other key aspects to influence the development of CT. In this end, we synthesize the literature on CT development and the respective educational practices and teaching methods that support its development. Analyzing the educational practices synthesized from the meta-analysis and reviews by chronological side, we can observe what were the main research questions related to the instructional methods that can develop CT. These research questions represented the basis for further research directions. The main questions brought into attention the particularities of CT development, which can be separate or merged with the specific of the discipline. The next question that emerged was about the condition of teaching CT separately or in the same subject area. Moreover, the following query was about the structure of CT concept as skills that can or cannot be generalized and are or are not adequate to be transferred to other domains (i.e. transferable or nontransferable skills). Furthermore, evidence supports the fact that CT skills and dispositions can be taught at any age, respecting the particularities of the students' ages. Not lastly, the teachers should be trained and familiar with the CT skills and dispositions in order to be able to enhance them among their students. In terms of teaching methods approach, the literature shows a lack of research establishing the effectiveness of the existing approaches. However, some methods were suggest-

ed to be used in order to develop CT. Among these we can count real-world problem exercises, recitation and discussion, group work, cooperation and teacher higher cognitive questioning (Kennedy *et al*., 1991).   After the '90s, empirical research emphasized the need for CT as an aim in the educational system. As far as concerns the students' behavior that significantly improve CT, empirical data revealed that: the students that live on campus and are involved in student organizations, clubs and in a continuous interaction with experienced peers are rather prone to gain more CT compared to students that did not meet those conditions (Gellin, 2003). Moreover, research suggests that cooperative learning and group discussion, interdisciplinary approach among constructivist learning environments, social constructivism approach and the out-of-class experiences instruction enhances and promotes CT. Furthermore, teaching methods such as discussion, dialogue, fish bowling, promoting inquiry, creative controversy model and academic controversy in coop - associated with small group teaching and designing situations where students make inferences, all these methods are reported to enhance CT (Ten Dam & Volman, 2004). Thus, other significant pedagogical grounding are instructor training, extensive observations, detailed curriculum description and the existence of CT among course objectives. Moreover, the student collaborative learning condition is significant in developing CT (Abrami *et al*., 2008). Although it seems that the findings are going in the same way, the review of Behar - Horenstein & Niu (2011) added more understanding to the CT concept. Even the literature presents some ways of work, using the same instructional interventions can lead to different results. Regarding the teaching methods to improve CT skills several methods have been presented such as concept mapping, scenario-based course exercises, active learning techniques, problem based learning, inquiry based learning, question approach, guided practice and computer-assisted instruction. Related to the significant effect on CT skills engaged in instructional intervention, empirical studies reported significant predictors such as student discipline and treatment length (Niu *et al.*, 2013). Through an in-depth exploration of previous findings, Tiruneh Tiruneh *et al.* (2014) established the following results obtained from the review made: CT principles can be made direct (i.e., presented explicitly) or implicit (i.e., without an explicit presentation of CT skills) in teaching strategies and through instructional approaches that influence it. Likewise, direct teaching strategies are more effective in improving CT alongside general, mixed and infusion approaches. As well, the most used approaches in CT instruction are infusion and immersion. Thus far, here was no study reporting the significant gender difference regarding CT gains. In addition, the authors reported teaching methods such as scaffolding, teacher modeling, role playing and already used small group discussion. General CT skills can be developed by instructional strategies such as discussion (notably where the teacher formulate the questions to whole-class or to group) or a mix of mentorship (coaching), dialogue and authentic/applied problems or examples (case study, role-play or simulations; Abrami *et al.*, 2015). Not least, one recent review in CT practice in European higher education (Dumitru *et al.* 2018) revealed the most used types of intervention in fostering CT

are: self-study, dialogue, authentic situations, mentoring and experiment. Moreover, the teaching methods reported to be efficient in fostering CT are: lecture discussion teaching, problem based learning (inquiry), argumentation and peer review.

Reaching the teaching methods that develop CT, for a better understanding we organized them in three main categories: oral, writing, and applied. In this way, it allows teachers to choose the desired methods according to their own needs. Moreover, oral activities are the most used methods to develop CT, followed by applied activities. These results are due to the connection that exists between oral interaction that is a most frequent human activity for daily situation. Thus, the less used activities are the written ones that can be associated with formal education (i.e., school or university).

Conclusions

Being a trendy concept for the 21st century, because of its practical implication as the ability to discern through true and false information, by making informed decisions, CT enjoys serious representation in the literature. In the above study, we initially presented the contextual factors that promote or inhibit CT (i.e., institutional level, teaching level and at the course level) and Ennis's course approach to teach CT (i.e., general, infusion, immersion and mixed). To enable a complex overview on CT development, we emphasize the instructional approaches (i.e., individual study, dialogue, authentic or anchored instruction, mentoring or coaching) with positive effect over CT outcomes (Abrami *et al.*, 2015). We further synthesized the meta-analysis and reviews of studies published between 1940 and 2017 related to educational practices that develop CT. Lastly, we gathered the results from meta-analysis, reviews and studies on specific teaching methods that develop CT in higher education, and we organized them in three categories (i.e., oral, writing and applied).

It is necessary to take in consideration the contextual factors that has the power to promote or inhibit CT. These factors besides Ennis's approach to teach, and the instructional approaches form the necessary environment where CT can be developed.

The main results observed after reviewing and analyzing how CT was studied in the '40s to '90s literature, showed how the concept evolved over the years. First, it begins with basic questions such as: the specificity of the CT skills, the generalizability and transferability of CT skills from one domain to another. It continued with the way that these CT skills should be taught (i.e., in the same subject area or separately) at which age we teach such skills and closed up with the need for the teacher's training on CT principles in order to understand the phenomenon and be prepared to teach/apply it in the classroom. Further, new research brought the CT concept as an aim of education and the theoretical ground filled with a constructivist learning environment and social constructivist approach. Ennis's (1989) typology of courses is the most frequently used, mentioning that the

infusion and *immersion* is the favorite in practice (Behar - Horenstein & Niu, 2011; Dumitru *et al.*, 2018). Concluding the results from teaching methods used over the years in obtaining gains in CT we can observe that in the beginning of the research there was a lack of studies to show the most effective teaching methods that develop CT. Overall, prevail the methods that use interaction (eg. small group discussion, group work, activities in cooperative groups, small group teaching and active learning techniques) among real-world problem exercises, guided practice, scenario-based course exercises, and teacher higher cognitive questioning, designing situations where students make inferences methods as fish bowling, problem based learning, teacher modeling, scaffolding, role playing and lecture discussion teaching, all those methods contributes to gain CT.

Concluding on the teaching methods found to develop CT, we could infer that oral interaction are the most frequent way to develop CT. Applied activities are the next numerous in terms of methods that develop CT. These results are due to the fact that CT skills are interconnected to the applied to every day situation. Finally, the least numerous activities, the written ones, conclude the multitude of activities offering methods based on writing, thus covering the entire educational activities.

The theoretical implication of this study consists of providing a synthesis of the overall aspects that contribute to CT development. This further enables a conceptual understanding of what helps and what should be considered in the research of CT development. Research should further consider the contextual factors, the educational practices and teaching methods when evaluating the educational process of developing CT. The paper enables this approach by presenting each relevant contextual factors, educational practices and teaching methods that facilitate such efforts.

Knowing more, an ideal CT instructor will take care to integrate CT into subject area instruction by using it as content for the application of CT skills. Moreover, the instructor will support the students to engage them in the transfer and generalization process of CT skills to many contexts (Facione, 1990). In the end, the open question remains whether higher education enhance CT skills and how (Dwyer & Eigenauer, 2017; Huber & Kuncel, 2016)?

Empirical research on developing CT is a key topic of research with implications for developing and supporting the educational development. Further research should focus on expending the overall understanding of what develops CT. Specifically, the educational practices and teaching methods should be further explored in action research. Different contextual factors should be explored and considered when aiming for CT development. Future work should also focus on the factors and the environment that develop specific CT skills and explore which methods develop certain skills of CT.

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