Final paper:

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Literary review of teaching critical thinking in higher education

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Argue with science

Spring 2021

This paper provides an overview of the literature surrounding the subject of teaching critical thinking in higher education. The first section discusses the importance of critical thinking in higher education and across disciplines. The second part goes through the various definitions of critical thinking. The third part addresses the theoretical debate between researchers regarding how to teach critical thinking. The fourth part discusses empirical evidence in the field. Part five concludes this literary review.

The importance of critical thinking

The teachings of critical thinking (CT) have long been a relevant topic in contemporary educational research. Nowadays its relevance is growing still, as widespread information through a wide range of media sources of the internet, induces students and young people to be more aware of source critique, and what is facts from what is not facts (El soufi & See, 2019). Moreover, there is a large consensus among researchers today regarding the importance of CT in higher education (Moore, 2011; Puig et al., 2019), with many studies connecting the relevance of CT, for developing students into independent thinkers, as well as preparing them for life in different working fields (Andreou et al., 2014; Danczak et al., 2017; El Soufi & See, 2019; Howlett et al., 2016; Lorencová et al., 2019). CT has previously been reported as an important task in teacher education, where teachers have a responsibility to promote students' ability to adapt to new contexts, fluency and flexibility (Lorencová et al., 2019).

Critical thinking can further be regarded for its importance after graduation, as an examination by the Foundation for Young Australians (2016) reported that the demand for CT skills in employees has risen by 158%, which is the second sought-after skill behind digital literacy (whose demand has risen by 212%). This is an indication that CT is increasingly seen as an attractive skill in the workplace (El Soufi & See, 2019).

Furthermore, studies have discussed the emphasis of CT in different working fields. For instance, in nursing it is seen as relevant for developing rational thinking skills, analytical judgment and problem solving for nurses (Andreou et al., 2014). Similarly, Carvalho et al. (2017) explain that through the means of discussion and analysing CT, nurses can expand their knowledge of how to effectively assess situations in their work. Having the ability to think critically is vital for nurses, in order to generate and promote the use of knowledge in practical contexts. Through the means of different strategies such as CT, educational institutions therefore play a large role in preparing contemporary nurses for such situations that might arise during their work (Carvalho et al., 2017).

Additionally, CT has gotten validity in the field of chemistry, as there have been many studies who have reported on attempts to teach CT to students through several methods, ranging from writing exercises and open-ended practicals to gamification and work integrated learning (Danczak et al., 2017). Additionally, skills such as CT are important if higher education institutes

are to prepare graduates in the field of chemistry, and for students to find employment later on (Danczak et al., 2017).

Addressing the importance of CT in the field of sustainable development, Howlett et al. (2016) discuss the need for higher education to make substantive changes in curricula, and practical ways of teaching, in order to challenge current ways in which we are thinking about the environment, with the purpose of addressing these issues in a proper manner. Such a change, they argue, requires critical and reflective thinkers, that in creative and through interdisciplinary ways of thinking, can reflect upon interactions between human and environment (Howlett et al., 2016). Simply put, this claim is that higher education carries a lot of responsibility for fostering reflective and critical thinkers, which in turn is a crucial element if we are to solve environmental crises and reach a sustainable society.

What we have seen so far is an overview of the implied significance of CT, among a small sample of disciplines. In most of these fields, CT seems to play a substantial role in an array of different circumstances, varying from being able to think analytically, to having the ability to adapt to situations of sorts. There are, of course, a multitude of other disciplines not mentioned here, in which CT is often applied. But what we can make of this so far, is that an extensive part of the literature surrounding CT accordingly emphasises its importance in higher education.
Although there is a widespread acknowledgement regarding the importance of critical thinking in higher education, the literature across the discipline is not without its disagreements. On the one hand, researchers in this field are at a consensus concerning the significance of teaching CT in higher education. On the other hand, researchers have not found a common definition of the term, as well as agreed on how to teach it in successful ways (El Soufi & See, 2019; Puig et al., 2019).

The definition issue: what is critical thinking?

One of the main issues that has sprung the debate of CT is how to define what the term actually means. As noted earlier, researchers in this subject are yet today at a standstill, and there is a lack of consensus behind the meaning of CT (Larsson, 2017; Puig et al., 2019). The dilemma, of finding a common meaning of the term, has been going on for at least the past 40 years without coming to any firm conclusions (Ennis, 1989; McPeck, 1985; Moore, 2011; Davies, 2013). Later on, I will delve into the core of this debate, discussing the approaches of CT that have emerged within the discipline from the ongoing debate, highlighting some of the main arguments brought up from the different approaches. For now though, I will focus on the various definitions of CT that researchers have used.

One of the widely accepted and used definitions of CT, was conceptualized from the so-called Delphi project. The growth of the critical thinking movement in the 1980s raised concerns in higher education and research regarding inadequate evaluation strategies (Facione, 1990). It was from here that the Delph project emerged. Sponsored by the American Philosophical

Association, a panel consisting of 46 experts, from a variety of academic disciplines, were given the purpose of identifying and characterizing the definition of critical thinking (Facione, 1990). CT was defined as "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological or contextual considerations upon which that judgment is based" (Facione, 1990, p.4). One interpretation of this definition could be that an individual should be able to purposefully reflect, analyse and interpret upon the context of different situations, as well as being able to think logically and rationally in different contexts.

In contrast from Facione (1990), another prominent figure of critical thinking, R.H. Ennis, urges that CT would more commonly be defined as ''reasonable reflective thinking focused on deciding what to believe or do" (Ennis, 2018, p.166). Additionally, Ennis means that CT can be described as a set of skills or dispositions, teachable to students separately from specific disciplines, through the means of independent courses aimed at teaching CT (Ennis, 2018). While Ennis seems to think of CT as a generic or universal set of skills, another prominent figure, J. McPeck, stands in stark contrast to this view, as he argues that "*thinking*, let alone critical thinking, is always about some particular thing or object [...], and that it therefore makes little or no sense to say 'I teach thinking *simpliciter,*' or 'I teach thinking in general but not about anything in particular.' All such talk is literal nonsense." (McPeck, 1985, p.295). Moore (2013) adds to this conception, as he mentions that according to this 'specifist' view, CT should be applied within a specific discipline, rather than be interpreted in a universal context. A way to summarize this interpretation of CT, is thus that since each subject domain has its own way of thinking, the best way of seeing CT is limited within each specific subject. Hence, seeing CT as a general set of skills that one can apply to each and every discipline is, in the view of McPeck, flawed.

There are furthermore other definitions of CT that could be mentioned. Paul (2005) for example, expressed it as "the art of thinking about thinking in an intellectually disciplined manner" (p.28), which, similarly to Ennis, could be translated to the ability to reflect upon one's thoughts in rational manners. While there exist many definitions of CT, Cargas et al. (2017) claim that most of them contain overlapping elements with not many unique features separating them from one another. Ennis (2018), in similarity, asserts that each definition is another way of cutting the same conceptual pie, implying that in the end many of the different meanings of CT are still very similar to one another.

The reader of this paper might at this point wonder why the previous section is important, or what the implications are of there not being a common definition of CT. On the surface, while these matters may seem trivial, Moore argues that the way in which vital traits such as critical thinking are conceptualised in institutions, could have serious ramifications on the framing of higher education curricula, as well as education programs altogether (Moore, 2011). Although Moore does not state so himself, the outcome of these debates seem to be important because whether higher education is teaching out the most successful way of fostering CT or not, could

therefore have implications for society as a whole regarding preparing students for after-graduate employment and more.

The theoretical debate: approaches of critical thinking

In the previous section we could make out a general divide in how to define CT, emphasized between the definitions of Ennis (2018) and McPeck (1985). On one hand, there is the general definition, describing CT as a universal set of skills, and it not being confined to a specific discipline, while on the other hand, the specifist definition of McPeck has it that CT has a different meaning and use dependent on the context of each specific subject (Ennis, 2018).

There are, of course, a number of other approaches that one can consider. Apart from the general approach already discussed, Ennis (1989) mentions three other instructional approaches of CT: the infusion, the immersion and the mixed approach. The infusion approach focuses more on content matter than the general approach, while teaching CT *explicitly*. The immersion approach is similar, but it instead teaches CT *implicitly* without stating it as an objective. The mixed approach teaches CT as an independent path within a specific discipline or domain. However, it is mainly the two sides of generalists and specifists that are the ones constituting the debate of how to approach CT. In a debate where the main question surrounds how to teach CT in the most successful manner, the general approach regularly proposes teaching CT to be done in general courses separate from, and independent of, the disciplines. On the contrary, the subject-specific approach rejects the idea of specific CT courses, and instead advocates for CT to be included in the context of each specific discipline (Ennis, 1989). This debate has further been highlighted through the works of Moore (2011) and Davies (2013). This next part will hence deliberate and reflect upon this debate through the arguments made by Moore and Davies. The reason for explaining the debate mainly through their texts is because of the compelling discussion between them, but also because I would argue that they bring up the main points from both sides of the spectrum.

In his article "Critical thinking and disciplinary thinking: a continuing debate", Moore (2011), gives a harsh critique of the generalist approach, mainly based upon the fact that generalists do not take into consideration the 'variety of modes of thought' throughout the different disciplines. This point is largely tied to the assumption that skills and abilities of CT, once taught, are transferable to a variety of different academic fields. While generalists and Ennis believe that CT skills are transferable across disciplines (Ennis, 2018), Moore and subject-specifists, on the contrary, find this contentious and debatable (Moore, 2011). Moore instead argues for CT as a form of 'metacritique', where an essential quality to be taught is flexibility of thought and the ability to switch through a range of a variety of critical thinking modes that takes into account the diversity between different academic fields (Moore, 2011). To prove his argument of the general approach not being sufficient enough, Moore conducts a study analysing CT in three disciplines - philosophy, history, and literature/cultural studies. The central question being what experts in their fields thought critical thinking meant, in the context of their teaching (Moore, 2011). Findings suggested that the domain of philosophy interpreted CT based on *evaluation* and

being critical towards ideas one is presented with. History on the other hand, was more focused on *judgment of sources*. Finally, literature seemed to think of CT more as *interpretation of texts*. Moore mentions that the answers from the interviewees/experts in these three fields gave different interpretations and understandings of what CT is. From this, Moore draws the conclusion that critique can include quite different types of judgment. Moreover, Moore argues that many of the various number of understandings of CT from the interviewees, seem to be of different nature than the ones that are typically described by the general approach, such as the ones by Ennis (2018). Therefore, he concludes that these differences in the understanding of CT, amount to a rejection of the generalist view, since it does not take sufficiently into account the disciplinary variations reported on (Moore, 2011).

In his article "Critical thinking and the disciplines reconsidered", Davies (2013), while defending the generalist viewpoint, he also responded to Moore's study. Firstly, Davies critiques the study conducted by Moore based on the flawed methodology used, asserting that such a small sample size, consisting of "about six representatives from each area" (Moore, 2011, p.264), hardly makes for compelling data (Davies, 2013). Davies therefore implies that the evidence that Moore bases his argument upon is nothing more than unsupported views from a small number of experts in their various fields. Furthermore, Davies (2013) asserts that "[Moore's] position derives from assessment, by the investigator, of a small perspectival data set. It is the investigator's attitude of what seems to be the case, from how things seem to be to the participants" (p.532). This perception strikes an interest in me, as it could suggest that there exists an interpretation bias in Moore's assessment. First, I would mention that Davies has a fair point regarding the limitations of the study, and on the fact that Moore builds up his main argument based on a highly questionable sample. Moore is analysing what CT is, in the view of experts in various fields. Moore, while basing his argument on his study, argues that there is a clear reason to be skeptical about teaching CT through generic courses, *while disregarding* the very questionable use of method, and limiting sample size, that he is basing these valuations upon. Furthermore, what I would consider worrying in Moore's argumentation is that he fails to motivate his use of method, and the failure to motivate the election process of interviewees. The reader has no indication, whether it is a coincidence or not, that most of the interviewees are answering different responses that are in accordance with the view of Moore. Secondly, the answers provided in his study are open for interpretation, and there is possibility to interpret them in a number of ways. However, the interpretation and conclusion given by Moore is one, that I would say, goes in accordance with his view in order to validate his arguments.

However, disregarding limitations of the study, what about the argument itself that Moore brings up? Moore claims that the general approach is too 'generic' in its skills and thus unable to capture and explain diverse critical features of the disciplines (Moore, 2011). The response given by Davies (2013) is that CT skills are principally generic, although that does not exclude other ways one might interpret the word 'critical'. Additionally, he argues, the generalist position is aware of the different uses and meanings for CT in various dispositions, contrary to what specifists imply.

Another argument, brought up by the subject-specific approach, is the critique of the general approach not being adequate enough according to emerging literature (Moore, 2011). Davies does assert that some empirical work has, however, shown that teaching generic skills to students can improve their reasoning skills (Davies, 2013). Similarly, when it comes to employment processes, many employers desire generic skills over specific based abilities, implying that skills supported by general approach are more desirable than subject-specific in some instances in the labor market (Graduate Outlook, 2006, as referenced through Davies, 2013). On the contrary though, if CT would be understood as 'diverse modes of thinking' across disciplines, then there would be a risk for teaching CT to be 'forgotten' or given a lower priority in education as it would just be another part of the disciplines (Davies, 2013).

The theoretical debate, highlighted through Moore (2011) and Davies (2013), does provide a number of sensible arguments. However, what has been lacking in the discussion so far are empirical evidence backing up the arguments of how to teach CT in higher education. Moore (2011) claimed the general approach not adequate enough according to emerging literature. The next section will thus discuss this claim through the literature. It will also try to answer questions such as *what do findings of empirical studies say about how critical thinking is being taught today, and what is the most successful approach to teaching it?*

What is the most effective approach for developing critical thinking, and what approach is most commonly used today?

Many studies have been conducted in order to measure the effects of various pedagogical methods on development of CT skills. However, research have pointed towards studies in this field to be inconsistent, showing limitations in measuring CT (Behar-Horenstein & Niu, 2011; Larsson, 2017; Tiruneh et al., 2014), as well as methodological flaws making it hard to make quality assessments (El Soufi & See, 2019). Furthermore, others have stressed the need for more research and studies reporting on effective models of fostering CT (Antonova et al., 2020). However, despite empirical challenges of assessing CT, research in this field has tried to estimate the effectiveness of different pedagogical methods for the fostering of CT. But what does some of the literature and empirical data say regarding the development of CT? In a study aimed at identifying variables which determine higher education teachers' skills in CT, Janssen et al. (2019) analysed survey responses of Dutch university teachers through the Cognitive Reflection Test (CRT), a test assessing important aspects of CT. While some limitations were present in their study, such as a self-selection bias, and thus a sample not representative, as well as weaknesses of the CRT such as the restriction of CT to its rational thinking aspect, it still presented some interesting findings. Results showed that the performance of teachers in the CRT is determined by the teachers' strong disposition towards effortful thinking, their domain of teaching, as well as their level of education (Janssen et al., 2019). Even if one should be a bit sceptical of the significance of the results from this study, they still indicate that teachers' variables could be important for developing CT in students. This is in similarity with Tiruneh et al. (2014), noting on the effectiveness of teaching variables such as teaching strategy and CT

teaching approaches for CT, while student related variables like year level and academic performance had some relevance for CT development. Moreover, Bezanilla et al. (2019) reported on this topic in their review of the main methodologies of teaching CT. Drawing from a sample of 230 university teachers from Spain and Latin America, they concluded that teachers seem to use and consider three main teaching strategies as the most effective for fostering CT. These are oral and written reflection and argumentation; reading, analysis and synthesis of resources; and case studies (Bezanilla et al., 2019).

Empirical work and reviews have further evaluated the effectiveness and usage of different theoretical approaches in the teachings of CT. In their systematic review, Abrami et al. (2008) sought to explore the effect that different instructional interventions and approaches have on the development and effective use of CT skills. The review contained 117 studies out of a total of 20698 that met the inclusion and exclusion criteria. The results showed that the type of CT intervention and the pedagogical grounding explains a large part of the variability in CT outcomes (Abrami et al., 2008). This would indicate that the way in which CT intervention is provided in class does have an affiliation with how CT skills are developed. Along with what was presented by (Janssen et al., 2019), this finding plays on the significance of elements, related to the teacher, in fostering CT. Furthermore, reporting on the effectiveness of different intervention approaches, they found that the mixed approach, which teaches CT independently within a specific content course, had the largest effect. On the contrary, the immersion approach, where thinking critically is taught implicitly within a course, had the smallest effect on developing CT. From the findings, they concluded that *explicit* teaching of CT, where one also develops CT skills on a general scale before applying them to subject-specific course level, is most effective, whilst implicit teaching of CT is the least effective approach (Abrami et al., 2008).

An article that has further reported on the effectiveness of various approaches of fostering CT, made by Tiruneh et al. (2014) included 33 studies in their systematic review of the literature of CT. While the amount of data covered in this study was smaller than in (Abrami et al., 2008), the findings showed that the general, as well as the mixed approach, are more successful, compared to the infusion and the immersion approach, in improving CT skills of students in higher education. They moreover found that the infusion approach proved more effective than the immersion approach. The results presented here are generally in line with the ones of Abrami et al. (2008), suggesting that CT could be more successful if taught through the more general approaches, although especially when instructed in explicit manners rather than implicitly. Similar results regarding the use of explicit teaching of CT have been produced in other studies, through the use of different methods (El Soufi & See, 2019). Using both qualitative and quantitative measures, Cargas et al. (2017) explored the effectiveness of performance based tasks with feedback, on a common rubric in student classes in three academic fields. Using this method, they concluded that CT improves under explicit teaching of CT while also integrated in the disciplines. The common rubric they created across the disciplines could therefore be used to explicitly improve students' CT skills.

What we can underscore from some part of this literature is that explicit teaching of CT seems to provide a constructive measure for fostering CT skills in higher education, whereas some part of the literature would assert implicit instruction of CT to be less successful. As to various approaches, the literature in which I have reviewed suggests that the mixed approach offers the most successful development of CT, whereas the immersion approach is the least successful, with the general and infusion approach also working significantly well. Many of these results base themselves upon literary reviews, and it is evident that more empirical studies would be required to make a more precise estimate and to provide a greater understanding of which approaches are more successful. This is, on the other hand, contrasted with the challenges of finding adequate quantities of reliable empirical work in this discipline.

Interestingly though, as further noted in (Tiruneh et al., 2014) is that despite the general and the mixed approaches being more effective, they observed a shift in the amount of studies reporting on infusion and immersion approach methods. This could therefore indicate that there is a shift going on in teaching CT in more subject-specific courses over teaching CT in separate CT programs. These results are, interestingly, consistent with other studies showing that the immersion and the infusion approaches are significantly more frequently used today in higher education, compared to the general and mixed approach (Behar-Horenstein & Niu, 2011; Lorencová et al., 2019; Puig et al., 2019). Despite the fact that research points toward the mixed and general approaches on average being more effective, this shift could, however, imply that more and more teachers, as well as higher education institutions, are considering teaching CT in subject-specific courses, as a more promising way of fostering students' CT skills rather than through separate CT courses.

Conclusion

Research across several academic fields has highlighted the importance of CT in higher education, for several reasons. Some of them being that there is a need for developing students into reflective and rational thinkers, the preparation of students for employment after graduation, and also for being able to handle and interpret situations in this all the more complex, dynamic society we live in. Although a various attempts of defining CT have been made, there still does not exist a common, definite term for it. This has implications for how to assess and teach CT in the most successful way, with a standstill in the debate because of there not existing a clear consensus between the different approaches. Empirical works in the field offer several approaches and methods for fostering CT. Many of these studies evaluate the means of having CT as an explicitly stated objective in teaching, whilst combining it with various strategies such as discussion, performance tasks or analysis, as a promising approach. This is contrasted with implicit teachings of CT incorporated into the specific subjects, which were less frequently recommended and a less successful strategy. Despite these results, there are indications of implicit methods of the immersion approach as probably the most commonly used method in higher education today. Therefore, there seems to be a contrast between what ways are the most successful in fostering CT, to what ways are actually being used more frequently.

Unfortunately, this contrast is rarely mentioned in the literature, nor is it mentioned how future research could address it.

Furthermore, what is apparent about teaching CT in higher education, is that this field is lacking in consistent research providing solid estimates regarding teaching methods of CT. As some research in this literary review reported on, many studies have shown flawed methodology. The most occurring limitation in these studies noticed are small samples sizes, resulting in inconsistencies in the findings. As a conclusion, I would therefore point out the need for more research studies in this field through the use of a variety of different methods. Providing more studies with precise estimates would allow for firmer conclusions, regarding how to teach and foster CT, to be made.

Describe your searches, how did you go about it?
All of the searches were done through Google Scholar, Web of Science and Stockholm university library. The keywords used in the searches were mainly "critical thinking", "higher education" and "teaching". In order to find articles reporting on a more specific topic in the field of critical thinking that I was searching for, additional keywords such as "methodologies", "nursing" or "disciplines" were used, although to a limited extent.

What are your thoughts of the quality of your references?
I would say that the references I used vary in quality. While some work, as well as some of the authors, seemed reliable, there are still other studies used which I would not categorize as 'quality'. To mention three of those would be works by Antonova et al. (2020), Larsson (2017) and Carvalho et al. (2017). Reasons for this are primarily limitations in methodology or a lack in transparency in their work.

If you were to do this task again, for a bachelor thesis or other, what would you have done differently?
I would have started searching and finding relevant literature earlier. This would have given me more time to find literature of higher quality, as well as structured this literature review in a better way, allowing me to focus more on parts that I would consider more relevant and important to discuss. If I could describe this review in its now 'final stage', I would use the words 'messy', and 'all over the place', meaning that I do not necessarily focus on more interesting parts in particular.

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