

Chapter #16

FOSTERING CRITICAL THINKING IN TEACHER EDUCATION

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ABSTRACT

In teacher education, nurturing critical thinking skills in students has the potential to influence not only the quality of education that is delivered by teachers in schools, but also to allow future teachers to cultivate cognitive skills that they will transmit to their students. This paper presents the results of an exploratory study that experimented the *Practical Inquiry Model (PI)* (Garrison, Anderson, & Archer, 1999). The purpose was to examine the extent of critical thinking cues that participants utilized when reflecting, in writing, on a controversial problem that they could encounter in their practice after having received extensive instruction on various constitutive elements of critical thinking. These cues manifested by students helped inform on the effectiveness of the instructional approach utilized in the course. The results indicated that the majority of participants were able to propose new and innovative ideas, reflect and propose suggestions that went beyond the parameters of the problem, were able to consider and accept external information and were able to make relevant links to lived experiences or existing knowledge while considering the problem. Results of this study can help inform educational approaches and pedagogical practices that are conducive to nurturing critical thinking in adult students.

Keywords: critical thinking, practical inquiry, teacher education.

1. INTRODUCTION

There are numerous societal challenges faced by individuals who live in democratic societies. One of these challenges is the fact that rapidly evolving technology, and increasing access to technology, have caused an abundance of information to be readily available. This evolution is also provoking complex social and societal challenges that have yet to be encountered in history. In order to help higher education students navigate multifaceted situations involving a profusion of material, it has become increasingly important to help equip them with necessary cognitive processes. Critical thinking, in part, involves an objective and in-depth reflection and analysis of an issue to take position or to guide practice and action. Thus, critical thinking involves the ability to transcend the parameters of an issue to allow for multi-faceted reflection. Researchers and educators agree that developing critical thinking skills in students at all levels of education has important societal implications (Kpazai, 2015; Williams, 2005). In teacher education, the significance of helping student teachers think critically is noteworthy, since teacher education students will have the future responsibility of nurturing these skills in their students.

The current study focussed on the extent to which teacher education students were able to manifest critical thinking when faced with a simulated case study that represented a scenario that they could encounter in their daily practice. The purpose was to examine the extent to which critical thinking cues were expressed by students during data collection,

subsequent to their learning about critical thinking, using Garrison et al. (1999) Practical Inquiry Model (PI). This information will help to inform instructional approaches pertaining to critical thinking in teacher education, yet can also be transferred to other educational settings.

2. LITERATURE REVIEW

2.1. Defining critical thinking in contemporary society

Merriam-Webster dictionary (n.d.) defines the term “critical” as follows: exercising or involving careful judgment or judicious evaluation. As modern society faces a number of challenges, including addressing societal priorities such as the preservation of natural resources, ensuring economic stability, provision of satisfactory health care and education, amongst many others, it is of primary importance to nurture thinking structures that allow for a profound and critical reflection on societal issues. The importance of teaching students to think critically has been, in fact, widely accepted by researchers over the last several decades (Kpazaï, 2015; Kurfiss, 1988; McPeck, 2016; Williams, 2005). The intricacies that arise in daily life, the contemporary challenges that are faced, require rational and critical thought to navigate. Developing and nurturing critical thinking is therefore perceived as a notable and important priority in most higher education settings. Researchers agree that critical thinking not only helps students succeed academically, but also helps them attain a deeper and more profound understanding of the world through a more meaningful reflection on the information that surrounds them (Brookfield, 2012; Grosser & Lombard, 2008; Nelson, Palonsky, & McCarthy, 2017; Pitters, 2000). This critical and profound understanding thus allows them to contribute constructively to, and to function effectively in, democratic societies.

Defining what critical thinking is, however, can become challenging. The ability to think critically requires an unbiased and open-minded reflection that welcomes alternative and diverging perspectives concerning an issue. In a collective publication that dealt in depth with consideration on the nature, on the definition and on the operationalisation of critical thinking, Kpazaï (2015) confirmed that there is no consensus on a global and universally accepted definition of this concept, and that some of its definitional elements are contradictory in the scientific literature. He identifies critical thinking as an educational priority and as a transversal and transdisciplinary ability. In this explanation, Kpazaï (2015) evokes four definitions of critical thinking widely recognized in educational contexts, namely those of Ennis (1993), of McPeck (1981), of Paul (1992) and of Siegel (1988). These researchers consider critical thinking to be rational thought relevant to areas of study and that is determined by norms of thinking in the learner. Numerous other scientific investigations into critical thinking have attempted to define this concept. For example, Roy (2004), diverges from the notion that critical thinking is significant to specific areas of study. Moreover, he considers critical thinking to be the subject and method concurrently tending to resolve problematic and metacognitive situations to improve practice. This definition is supported by Norris (1992), a researcher who proposes that critical thinking is a process of auto-disciplined reflective inquiry, which allows the learner to see through and beyond ideological structures. Finally, the investigations of Kurfiss (1988), a researcher who has widely published on critical thinking, have traditionally defined critical thinking as follows: “It is an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion that integrates all relevant information and can therefore be convincingly justified ” (p.2). The desired outcome of

critical thinking is therefore not an absolute response to a question, problem or phenomenon, but rather a reasonable explanation of a response that is founded on deep, significant and multifaceted thought.

Other researchers have interpreted critical thinking to be a process of reflection that allows for the disruption of a phenomenon by questioning what is typical and expected and by adopting a position, which is grounded in the reflective process. This perception of critical thinking is supported by researchers such as Bourque, Prévost and Lang (2013) and Chan (2013), who propose that critical thinking requires the creation of uncertainty to allow a more rigorous study of knowledge. Similarly, Howell and Kemp (2015) suggest that critical thinking allows individuals to recognize the foundations of their knowledge and beliefs by analyzing them in depth. In short, even though the scientific community proposes a range of theories of critical thinking, researchers widely agree of the importance of developing it in educational environments (Kpazai, 2015; Ku, 2009; Nelson et al., 2017; Williams, 2005).

Critical thinking indicators utilized in this study were derived from Newman, Johnson, Cochrane and Webb (1996) and grounded in the written student narratives collected. It is important to note that, in the Newman et al. study, the goal was to assess the feasibility of developing critical thinking in online course delivery. In the current study, students were subject to face to face classroom instruction on critical thinking and critical literacy concepts. In addition to learning about certain theoretical constructs of critical thinking, they participated in a variety of open discussion forums, classroom activities and other simulations in which they were required to adopt critical thinking practices.

2.2. Critical thinking models

In light of the growing perceived importance of nurturing critical thinking skills in students, numerous researchers have proposed strategies to measure critical reasoning, to conceptualize it into a model or framework (Erickson, Lanning & French, 2017; Kuhn, 1999). In the current study, numerous models were analyzed prior to retaining the PI Model. One example utilized in adolescent and adult learners is the Reflective Judgement Model (RJM) developed by King and Kitchener (1994). These authors conclude that reflective judgement is an aspect of critical thinking that is often neglected in the scientific literature. The model consists of seven stages of reflective judgement, in which the early stages represent passively receiving and accepting knowledge at face-value, to later stages where knowledge is processed through a series of cognitive procedures and reflections, where conclusions are founded on probabilistic factors. It should be noted that the RJM is pertinent to the current study in the sense that it is geared towards adolescent and adult learners faced with problematic situations. For the purposes of the current study, however, it was concluded that problems posed in reflective judgement may fluctuate from those posed while evaluating critical thinking. King and Kitchener (1994) specify that evaluations of reflective judgement are based on epistemic assumptions, whereas critical thinking problems are treated through inductive and deductive reasoning, through a process of inquiry, as was the intent in the current study.

Another model that was considered is the model of Kuhn (1999), who specializes in cognitive development. In her words, her critical thinking framework is grounded in contemporary empirical research on human development ranging from early childhood to adulthood. Contrary to some other critical thinking frameworks, however, Kuhn considers that the intellectual competencies required for critical thinking are metacognitive rather than cognitive. Moreover, the study of metacognitive skills to develop critical thinking has been broached by other researchers, yet few have unequivocally linked this to critical

thinking. One example is Magno (2010) a researcher who has studied the role of metacognition in critical thinking, and supports Kuhn's position in his hypothesis that critical thinking occurs when individuals utilize metacognitive processes. Kuhn's (1999) model combines metacognitive, metastrategic, and epistemological processes that encompass a vital part of necessary cognitive developments to achieve critical thinking. She also proposes levels of epistemological understanding from different ranges of assertions that in turn require varying levels of critical thinking to achieve. While it was pertinent to consider developmental constituents in the nurturing of critical thinking skills in students, Kuhn's model was considered to be a means to enrich the empirical and scientific data utilized as a basis for the study, which is highly relevant yet did not necessarily correspond with the purposes of the current study, as the objective was to assess the outcome of a critical thinking process in teacher education students.

Ultimately, the Practical Inquiry Model (PI) (Garrison et al., 2000) was retained for experimentation in the current study. The PI and the rationale for its selection is further explained in the section below.

2.3. The practical inquiry model

According to Freire (1970/2010), a competency such as critical thinking is developed in a context where learners have an epistemological curiosity and conviviality with the subject. In order to progressively achieve a shift in interpretative authority of information, necessary for critical thinking to occur, the current study experimented the cognitive presence of teacher education students while faced with a scenario that could commonly occur in their practice and is based on a component of the *Community of Inquiry* (COI) Model initially proposed by Garrison (1991). The COI targets the adoption of pedagogical measures that are of notable importance in an online learning environment, notably social presence, cognitive presence, and teaching presence. While this model may have been initially developed for a distance education program (Garrison, 1991), its application is also appropriate in a face to face teaching environment (Newman et al., 1996).

In the COI model, social presence creates a communicative climate developed and maintained by the professor through social-emotional exchanges between the learners (Garrison et al., 2000). Teaching presence is the conductor that links other components of the model (social and cognitive presence). A more recent study has concluded that this element is of primary importance in developing a critical pedagogical environment (Garrison, Anderson & Archer, 2010). The assumption was that cognitive and social presences require an educational facilitator and that when teaching presence is insufficient, cognitive and social presences will also become insufficient. Teaching presence implies the creation of a classroom climate that allows for the exchange of ideas and discussions that contain a critical analysis and a profound construction of knowledge of learners. This presence also requires feedback or a contribution from the instructor during exchanges and critical reflections (Garrison et al., 2000).

The current paper treats one constitutive element of the COI, namely the Practical Inquiry Model (PI) (Garrison et al., 2000; 2010), which particularly focusses on cognitive presence in the classroom. The operationalisation of cognitive presence in the PI is grounded in Dewey's (1933) phases of reflective thought reprised by Swan, Garrison and Richardson (2009). This model is commonly associated with critical thought. The stages of the PI consist of the triggering event, the exploration, the integration and the resolution. The triggering event refers to the feeling of dissonance that is created by the event. The exploration phase represents the quest for information to improve or resolve the event. The third phases constitute the gathering of information into a coherent whole, while the fourth

phase describes the proposed resolution of the event (Garrison et al., 2000). As such, cognitive presence in the PI is conceived as a holistic process associated to a triggering event that resorts to ulterior phases of perception of the event, to deliberations concerning the event and to actions grounded in these phases to improve or to resolve the event (Garrison et al., 2000; 2010).

It is important to note that certain studies that have tested and experimented this model have concluded that students had difficulty reaching the integration and resolutions phases (Garrison et al., 2010), but that these challenges could be linked to limitations in design and experimentation. Numerous studies also demonstrate that cognitive presence largely depends on the cognitive climate in which the inquiry is taking place (Garrison et al., 2000; 2010; Newman, Webb & Cochrane, 1997) and that cognitive presence is not sufficient in isolation to sustain a critical sense in a classroom. In the current paper, social and teaching presence were fulfilled by the educator responsible for the course and by students who participated in the course in which experimentation took place.

3. RESEARCH METHOD

3.1. Participants

The process of selecting participants was pre-established according to two criteria: they were required to be teacher education students and were required to have participated in two courses (Critical Literacy in the 21st Century and Teaching of English). A total of 30 students agreed to participate in the experimentation designed according to the PI (Garrison et al., 2000).

3.2. Experimentation

Experimentation was undertaken following twelve teaching sessions pertaining to critical thinking. Participants learned theoretical and practical notions related to this concept, under the premise that they would eventually apply critical thinking skills in their classrooms themselves, and transmit these learned skills to their students. Some of these sessions included theoretical presentations of various critical thinking definitions, as well as practical applications of instructional strategies meant to develop critical thinking following the *Guided Comprehension Direct Instruction Framework* developed by McLaughlin & DeVoogd (2004). The framework includes the following steps to presenting a critical instructional strategy: Explain the strategy (what it is, how it works), Demonstrate the strategy (using a think-aloud or visual support), Guide the students (in small-groups, guide them while they are applying the strategy), Practice the strategy (by having students work independently or with a partner/group) and Reflect on the strategy (reflect on how the strategy can help to develop critical thinking). Several strategies were taught to students using the framework as a basis, such as the Alternative Perspectives strategy, which has students reflect on a text or issue by adapting a different or unexpected viewpoint, and the *Problem-Posing* strategy, which requires students to engage in critical analysis of a video, text, discourse or controversial issue (McLaughlin & DeVoogd, 2004). They also participated in numerous discussions about varied problems or issues that practicing teachers could expect to encounter during the course of their duties, and reacted critically to numerous texts and publicities of current events. Following the twelve sessions, the course instructor presented the PI model to participants with the explanation that it was commonly associated with critical thought. The following fictional scenario was then presented in

order to examine the extent to which participants were able to manifest critical thinking indicators:

Mrs. X. is a veteran teacher and a popular coach for several sports. She is well known for the concern for the welfare of her students. Since the school has limited resources to accommodate practices and games for some of its teams, students are responsible for their own transportation to other sports venues. Consequently, it is not uncommon for Mrs. X. to provide personal transportation to some of her students to athletic events and back home after the events.

Participants were then given classroom time (approximately 60 minutes) to reflect on the problem and attempt to find possible solutions from multiple perspectives, while describing their reasoning in writing and following the stages of the PI. Written responses were then collected and analyzed.

3.3. Data Analysis

The data analysis process derives from a constructivist approach and consists of a qualitative thematic content analysis inspired from Newman, Webb and Cochrane (1995). This approach prescribes specific elements that are indicative of critical thought in the PI model. These critical thinking indicators represent surface elements (ex. repeating the information presented in the triggering event – low critical thinking) and deep elements (ex. adding new or original solutions – indicative of critical thinking) presented in participant responses, which indicate to what extent they are exhibiting a deeper level of thought.

The first step consisted of a first reading of the transcriptions collected from participants and becoming familiar with the coding scheme proposed by Newman et al., (1996). It should be noted that transcriptions were organized and treated according to the corresponding stage of the PI model. Coders then made a second reading of the transcriptions by attributing codes to every idea or excerpt. Data was analysed by noting a + beside every idea that demonstrated deep critical thought, and a – beside ideas that demonstrated surface elements, or superficial ideas. The ratio of the depth of reasoning was then calculated to determine the depth of critical thinking in excerpts. The ratio could range from -1 (demonstration of surface ideas only) or +1 (demonstration of deep ideas only), as proposed by Newman et al. (1996). The following formula was utilized:

$$\text{Depth of Critical Thinking Ratio CT} = (x+ - x-) / (x+ + x-)$$

The x+ is the total of positive ideas in a transcription, whereas the x- is the total of negative responses. The last stage of analysis consisted of representing results in a table and of noting elements representative of both types of ideas as examples.

4. RESULTS

The analysis of results based on referents of critical thinking indicators reflected a preponderance of positive elements, which indicated that the large majority of participants manifested critical thinking. Table 1 (below) presents the ratio of deep and surface ideas that were exhibited by participants.

Table 1.
Critical thinking indicators and ratio according to Garrison's (1991) stages of critical thinking and reprised by Newman et al. (1996).

Symbol	Indicator	Participant Code	CT Ratio
R+	Relevant Statements	1	1
R-	Irrelevant Statements, Diversions	2	1
I+	Important points/issues	3	1
I-	Unimportant, trivial points/issues	4	0,83
NP+	New problem related information	5	0,81
NP-	False or trivial leads	6	0,78
NI+	New ideas for discussion	7	0,75
NI-	False or trivial leads	8	0,50
NS+	New solutions to problems	9	0,40
NS-	Accepting first offered solution	10	0,33
NQ+	Welcoming new ideas	11	0,33
NQ-	Squashing, putting down new ideas	12	0,33
AC+	Clear unambiguous statements	13	0,33
AC-	Confused statements	14	0,33
OE+	Drawing on personal experience	15	0,25
OC+	Refer to course material	16	0,23
OM+	Use relevant outside material	17	0,20
OK+	Evidence of using previous knowledge	18	0,17
OP+	Course related problems brought in	19	0,14
OQ+	Welcoming outside knowledge	20	0,11
OQ-	Squashing attempts to bring in outside knowledge	21	0,11
O-	Sticking to prejudice or assumptions	22	0,09
L+	Generating new data from information collected/Linking facts, ideas and notions	23	0
L-	Repeating information without making inferences or offering an interpretation/Stating that one shares the ideas or opinions stating, without taking these further or adding any personal comments	24	0
JP+	Providing proof or examples	25	-0,08
JP-	Irrelevant or obscuring questions or examples	26	-0,11
JS+	Justifying solutions or judgements/Setting out advantages and disadvantages of situation or solution	27	-0,20
JS-	Offering judgements or solutions without explanations or justification	28	-0,27
JS-	Offering several solutions without suggesting which is the most appropriate	29	-0,40
P+	Relate possible solutions to familiar situations	30	-0,66
P+	Discuss practical utility of new ideas		
P-	Discuss in a vacuum/Suggest impractical solutions		
W+	Widen discussion		
W-	Narrow discussion		
Mean:			0,28

Table 1 shows that 22 of the 30 participants predominantly exhibited deep ideas in their transcriptions. Only two participants had an equal proportion of deep and surface ideas, while six participants had more surface ideas than deep ideas. The following paragraphs provide examples of ideas represented in both categories.

4.1. Surface ideas

Certain elements of participant responses represent characteristics of surface/superficial level. One example of this is, rather than highlighting new ideas during the Integration phase, a participant drew an arrow to repeat ideas presented in the Triggering Event and Exploration phases. Another statement indicates: “We must implement ways to ensure student transportation.” without proposing specific ways to do so. Other statements enumerated multiple solutions, without mentioning what solution was more appropriate and explaining their reasoning “alternative rides should be provided” or “I would get the school to provide transportation for the children”. Some transcriptions indicate that all ideas proposed in the Exploration phase are appropriate, without critically sorting the information to find an optimal or deeper solution to the issue “All issues I have presented I find relevant”. In other instances, ideas were considered to be surface ideas where they proposed a solution that was already addressed in the problem. For example, a few participants noted that parents should be responsible for their children’s transportation: “parents should drive their own children to practices”, “parents could drive their children instead”, and “I would suggest that if parents aren’t comfortable with the idea that they could go with the kids and drive the kids themselves”. Another participant notes that “the school could provide more transportation to their students”, and another “The responses/actions that would result in a more positive outcome would be for the school to organize a bus for the students to travel to their sports events”. Given the fact that the problem stated that the school had limited resources to arrange transportation, responses that suggested that the school or parents arrange transportation without providing tangible solutions were considered to be surface ideas that did not delve into critical thought. As such, these types of responses were judged by the coders to be devoid of critical reflection, and were characterized as surface ideas.

4.2. Deep ideas

The majority of participants, nonetheless, explored numerous resolutions from a variety of standpoints, which demonstrated that they were able to consider multiple and conflicting stances when forming an opinion or proposing a solution to the problem posed. For example, some viewpoints presented conflicted with each other, such as: “Some negative reactions to this scenario could be false accusations towards the teacher or the student, due to the lack of supervision in the car; however, one positive aspect is that the teacher is concerned with the student’s well-being.” Other participants also suggested possible long-term consequences for the problem in terms of students decide to not participate in other sporting events, for example: “Students could feel uncomfortable if the teachers conducts herself inappropriately. Not knowing who they can trust can have a negative impact on students.” And the following: “Students could lack confidence or motivation to participate in sporting events... no support=no motivation.” These cases represent information pertaining to a new problem that derives from the initial problem. Other participants evoke information outside the scope of the problem, for example the fact that many inappropriate relationships between teachers and students are reported in the media and that teachers are required to adhere to the ethical standards of the *Ontario College of Teachers*: “Parents could be concerned as it puts their children in a vulnerable position” and “The negative consequences for the teacher are accusations of favoritism and potential accusations of unprofessionalism”. One participant suggests that even if nothing inappropriate is occurring in the car, the teacher who is interacting with students without other adult supervision is exposing herself to the possibility of accusations. Another notes that: “It is for the image of the school, of the kids, and of the community.” In this case, the

school is perceived as belonging to the community as a whole rather than as an autonomous institution. In sum, participant written responses that raised new and pertinent information and viewpoints were considered to be deep-level ideas.

5. CONCLUSION/DISCUSSION

In an experimentation similar to the one conducted in the current study, Garrison et al. (2000; 2010) observed that students rarely achieved the integration and resolution phases. Kuhn (1999) supports this finding in her assertion that one of the more common challenges in teaching critical thinking is that the knowledge gained is rarely generalized beyond the educational context. For the current study, data was collected at a time during which students has been extensively immersed in critical thinking education. The course professor had created an environment in which students were exposed to theoretical and practical critical thinking notions, and in which they were constantly encouraged to share multiple and varied viewpoints. Students also learned about the different stages of critical thinking in the PI model. Williams (2005) notes that the proclivity for participating in various critically engaging activities, in which the status quo is explored and challenged, represents a disposition for critical thinking. The context that was created in the classroom for the current study, which involved an infusion of critical thinking in educational activities is therefore one that characterizes students being engaged in an environment that nurtures critical thinking. This suggests that they would have been more likely to exhibit critical thinking due to being completely immersed in their educational context for a long period of time. Given the fact that the majority of participants manifested profound critical thinking skills in the current study, and based on the assumption that it could be in large part due to having learned extensively about critical thinking, it would be interesting to examine whether they would have been able to continue to apply their gained knowledge in their future professional contexts. It would also have been interesting to study whether groups of participants not exposed to extensive critical thinking instruction would have been able to think critically when faced with a similar fictional scenario. For the purposes of the current study, however, it is reasonable to conclude that the instructional strategies employed in the course helped students think critically, for the reasons mentioned above. Furthermore, as stated by Williams (2005): “Unless teacher education students become skilled in discussing seminal issues in society, they are unlikely to model and teach those skills to their students” (p. 182). It is noteworthy to mention, however, that engaging in critical thinking activities during student teacher education training is not sufficient to address all societal issues that exist in modern society, yet could contribute to helping teacher training become relevant in the K-12 educational framework, which would, in turn, dispose future generations to engage in critical thought in their social and societal contributions.

Nonetheless, as reflected in this paper and numerous other critical thinking studies (ex., Erickson et al., 2017; Kpazai, 2015; McPeck, 2016; Williams, 2005), it is important to create teaching and learning contexts that are conducive to developing critical thinking competencies, which will in turn allow students to function more effectively in democratic societies. The link between teacher training and societal efficiency for problem-solving is clear, because teachers are responsible for the education of primary and secondary students. The results of the current study can help to frame an educational approach that helps students reorient their cognitive processes to consider multiple positions when faced with a contemporary issue or challenge. Critical thinking competencies acquired by future teachers are indispensable to their teaching these competencies to their students, who will be responsible for maintaining an important societal mission, that of improving and maintaining quality of life for all citizens.

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