

**WHY DO I THINK THE WAY I DO? TROUBLING THE CONCEPT
OF CRITICAL THINKING IN PHARMACY CLASSROOMS**

A THESIS SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Erika Lourenço de Freitas

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Djenane Ramalho de Oliveira, Ph.D., adviser

March 2014

© Erika Lourenço de Freitas 2013

Acknowledgements

The completion of my PhD has been a long journey. I have finished, but not alone, and I am elated. I could not have succeeded without the invaluable support of several people. Without these supporters, I may not have gotten to where I am today, at least not sanely.

To this select group, I'd like to give special thanks, beginning with my adviser and beloved friend, Dr. Djenane Ramalho de Oliveira. It has been an honor to be her first PhD student. In her I have a life-long friend, mentor, and colleague. She has supported me academically and emotionally through the rough road to finish this thesis. She believed in me when nobody else would (and Dje, you know what I mean here), and for these reasons and many, many more, I am eternally grateful.

I'd like to give a heartfelt, special thanks to my committee Chair and mentor, Dr. Jon Schommer, for his patience, flexibility, genuine caring and concern, and for his unshaken faith in me during the entire dissertation process. Dr. Schommer, thank you very much for your guidance and unconditional support!

My gratitude is extended to my thesis committee members – Dr. Timothy Lensmire and Dr. Marcia Worley – who guided me through all these years. Your competence and passion for research inspired me. Thank you so much for all the academic support and input throughout these years!

This dissertation could not be done without the collaboration of students, faculty and staff from the University of Minnesota. I could never thank them enough for their generosity and openness in participating in this research. The changes that will originate from this work will always be a stem of their generosity. Students, you are the reason of all of this. Every single line written in this thesis was done with the profound intention to improve your experience as a learner. Thanks for being part of this endeavor with me.

The greatest learning moments I had during my PhD happened in the living room of the apartment I shared with my fellow colleague and adored friend Elita. She taught so many things... from buying bagels at the supermarket to fighting oppression and racism in my daily life. Elita, to have you as my friend surpasses any accomplishment a PhD could ever bring to my life. Thank you so much for all you have done and been for me!

I'd also like to thank profoundly the amazing staff that helped me “navigate the system” and complete my PhD in a timely fashion. Val was one of the first friendly faces to greet me when I began this doctoral program and she has always been a tremendous help, no matter the task or circumstance. Thanks also to Tola and Dawn for all the help and encouragement!

My time at the University of Minnesota was made enjoyable in large part due to the many friends that became part of my life. I am grateful for the time spent with them and for the wonderful memories they have imprinted in my heart. Daniel, thanks for always bringing a smile to my face and for keeping your sense of humor when I had lost mine. Your generosity and friendship are greatly appreciated. Jake, you saved my PhD with that headlight during the power outage! Our friendship has lifted me in those gray days when I would feel lonely and homesick. Noah, what would be of your life without my bad jokes? You were always there for me. I will never forget your generosity and caring attitude. You are a loved friend! Cathy, we met for a reason... Thanks for being so encouraging, for believing in me, and for the many precious memories along the way. Caitlin, I owe you so much for all your support and unconditional love. Thank you so much! To my fellow colleagues – in special Ahmed, Taehwan, and Katerina – I am so glad I had the chance to share this road with you guys! Thanks for the support and encouragement along the way.

Linda and Peter, thank you so much for the advices and wise words in the moments I needed most. Thank you also for the fun moments and for being my safe haven in the United States.

These acknowledgements would not be complete if I did not mention Eugenio, the one who has been a source of love and energy ever since. He knew, even before me, that I could do it. I hope that this work makes you proud, Xu. I will be forever grateful for your love, patience, support and unwavering belief in me. And, to my Italian family, I must say that “Voi siete parte di questa vittoria! Vi ringrazio tantissimo per il vostro affetto ed i vostri preziosi incoraggiamenti.

And I finish with Brazil, where the most basic source of my life energy resides. Família Lourenço, nós chegamos la mais uma vez! Obrigada pelo apoio e amor incondicionais e por nao me deixar desistir nos momentos mais difíceis. Eu sou e sempre serei parte de vocês e essa conquista é nossa!

Abstract

The pedagogical processes through which students are supposed to become more reflective are important for preparing critical thinkers in the healthcare field. The dynamics of knowledge production and acquisition is placing increasing demand on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems. The concept of critical thinking has become paramount in the process of educating healthcare professionals in the practice of direct patient care. To date, however, there has been little engagement by institutions about what critical thinking means for the health care industry or how it can be effectively incorporated into educational curricula. Critical ethnography was the methodology chosen to help me understand how pedagogical practices influence students' development of critical thinking skills. I used participant observation, focus groups and in-depth interviews to examine how students, faculty and curriculum stakeholders navigate this subject at the College of Pharmacy, University of Minnesota.

Two semesters of fieldwork suggested that there is a subtle discrepancy between students' and faculty's perspectives when it comes to teaching and learning critical thinking skills in the classroom. The disconnection between teaching approaches and evaluation was pointed out as a factor that hindered critical thinking. Case studies, small group discussions and 'experiential learning' were emphasized as pedagogical approaches that foster critical thinking learning, but there are factors associated with the classroom setting that may prevent them to fully achieve their goal. The knowledge that emerged from this study will allow educators to design learning activities to more effectively develop these essential skills in our future caregivers.

Keywords: critical thinking, pharmacy education, patient care

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
ABSTRACT.....	iii
TABLE OF CONTENTS.....	iv
LIST OF FIGURES.....	vii
INTRODUCTION.....	1
Critical Thinking and Pharmacy Education: Why do I care? Why Should We?.....	4
LITERATURE REVIEW.....	10
Critical Thinking – The Concept and Its Application.....	11
Critical Thinking and Pharmacy Education.....	19
Assessing Critical Thinking.....	24
Critical Thinking and the Classroom.....	28
METHODOLOGY AND METHODS.....	32
Research Methods and Design.....	37
Data Analysis.....	45
Assuring Quality in Critical Ethnography.....	48
Ethical Considerations.....	52
RESULTS AND DISCUSSION.....	54
Foreword.....	54
Situating the Journey and the Findings.....	55

Critical Thinking: Pharmaceutical Knowledge Plus One Step Further.....	58
The ability to retrieve information.....	67
Catalytic factors.....	72
Background Knowledge.....	73
Experience.....	77
The algorithm of thinking.....	83
The Dynamics of Teaching and Learning Critical Thinking.....	89
Meet the teachers.....	90
Meet the learners.....	100
The good, the bad, the ugly, and the room for improvement.....	108
Lectures: information dump or thought ignition?.....	110
Case studies: choices to choose or chances to learn?.....	113
“Students don’t like critical thinking”: the reasons behind the whining.....	118
Clinical guidelines: fostering, hindering, or stifling critical thinking?.....	122
Curriculum integration: linking content, bridging gaps.....	125
Scaffolding: neither too simple nor too hard.....	127
Disconnections in the classroom: the ugly loose ends.....	130
<i>Classroom, practice, and patients: When will they come together?.....</i>	130
<i>Teaching what you need to know, assessing what you don’t know.....</i>	137
<i>On grades and motivation in the classroom.....</i>	142

The environment: hindering and fostering factors.....	147
Class size and the ambiance.....	147
Space and technology issues.....	155
Thinking Critically of What Matters in Pharmacy Education: The Forbidden Topics.....	162
Power struggles in academia.....	163
Does race matter?.....	169
The tug of war between teaching and research.....	172
FINAL CONSIDERATIONS.....	177
REFERENCES.....	182
Appendix I	203
Appendix II	204
Appendix III	206
Appendix IV	214
Appendix V	216

List of Figures

Figure 1: Critical thinking skills and examples in pharmacy practice	15
Figure 2: Affective dispositions of critical thinking	16
Figure 3: Characteristics of a strong critical thinker, according to the students.....	65

Introduction

Classrooms have always fascinated me. The experience of being a student for 24 years and a teacher for 9, in my home country – Brazil – and abroad, showed me the perils and promises of such a vibrant and alive environment. As Paulo Freire (1970) would say, classrooms are political spaces where education might take place either as practice for freedom – providing the knowledge, skills and abilities that enable students to expand their possibilities as critical citizens – or as an instrument that merely reinforces domination, reenacting rituals of control and unjust exercise of power that pervades the current social order. The dichotomy is clear: the classroom can serve as an instrument for either social change or reification of the society's *status quo*.

Already early in my formal education I learned that teachers must be respected and obeyed. This notion of respect and obedience let pass unquestioned the pedagogical practices used and the contents explored in the classroom. In the subtle “good student code” that I quickly learned from the latent messages delivered to me through the “informal curriculum” of high school, the rules were clear: no contestation, no confrontation, no questioning. Memorize, conform, perform, and succeed. I’ve learned “respect for teachers” as a dogma and, as such, it blinded my agency to doubt, diverge or to think “outside the box”.

In order to legitimize the way our society is organized, the schooling process that I went through has taught me that competitive behavior and social inequality were almost like fundamental laws of nature. The “do this and you will get that” type of approach

regarded by Alfie Kohn (1999) as a social axiom for the incentive driven behavior cultivated by our society make so much sense to me, especially in the educational realm. I've learned at the school (and out of it) that some would be rewarded, others would be punished and that reward and punishment were purely results of my own efforts (Kohn, 1999). Given the binary choices presented to me, I picked my side: conform, perform, and succeed. The rewards came by. Despite being blinded in my ability to go beyond the information that was deposited on my mind, I managed to gain some professional success and prestige. As a healthcare professional, I fitted like a perfect building block, basically reproducing the existing state of affairs dictated by the ingrained social inequalities that abound in our society.

However, the subtle question of why things are the way they are could not be unattended for long, especially in a large, rich and unequal country like Brazil. I found my work as a pharmacist lonely and arid, unable to promote any big change in the major issues that affected my patients' lives. The idea that I could change the world wasn't coming along with my isolated practice as a pharmacist, so I decided to go back to the classroom, working as a teacher at this time. My understanding, at that point, was that education alone could change society. Durkheim (1951) certainly would be struck by my naiveté, since already in the 19th century he used to argue that education "is only the image and reflection of society. It imitates and reproduces the latter in abbreviated form; it does not create it" (p. 372). In fact, despite all my goodwill as an educator, I caught myself in the classroom reproducing the same indoctrination process that I have experienced in my own educational journey. And, as an experienced pharmacist product

of that educational model, I already knew how it would be reflected in practice. But then, how could I get out of that vicious cycle? That was the igniting question that led me to pursue my doctoral degree.

When I decided to take a step forward and to delve one more time into the academic world, I knew that I would have to revisit my educational beliefs. During my coursework as a PhD student, I was exposed to many different theories and approaches that challenged, illuminated, clarified and deepened my understanding of how educational practices are deeply inter-connected with the big picture of the social structures that govern our practices. It was an overwhelming process. Critical thinking, power dynamics, critical pedagogy, culture, social justice, and emancipatory education were some of the concepts extensively explored in this journey. I also found myself particularly interested in how classrooms can be a space for exploring how students make judgments that might influence patient's lives in a society dominated by unequal power relationships based on gender, race, social class, sexual orientation, physical ability and so on.

As a result, I decided to surrender to this field that has always interested me: education in healthcare. I took this research as an opportunity to deepen the understanding of how critical thinking skills and abilities can be used to deal with the abundance of information available in the context of pharmacy classrooms. Specifically, I was interested in pedagogical strategies used in the classroom and how these strategies might nurture or hinder students' abilities and dispositions to think critically when judging what is relevant in the context of patient care.

The question “why do I think the way I do?” in my project title is not related to the act of thinking as conceptually taken by philosophy, biology or psychology. Rather, I am willing to explore the inter-dependent complex of skills, practices, dispositions, attitudes and values that allow teachers and students to make inferences, analyze situations, interpret gathered facts, establish connections, and draw conclusions based on experiences, information, and resources available to them in the classroom.

Critical thinking and pharmacy education: why do I care? Why should we?

The pedagogical processes through which students are supposed to become more reflective are an important issue in preparing healthcare professionals who are also critical thinkers. The critical thinking tradition relies on the belief that the ability of humans for ‘good reasoning’ can be nurtured and further developed by an educational process aimed directly to that end as well as by the maturity brought by practice experience (Paul, Elder, & Bartell, 1997; Seldomridge & Walsh, 2006).

It might seem counterproductive, though, to do a PhD research on critical thinking, since at one level we all know what critical thinking means. It is popularly assumed to be that good thinking that helps us solve problems, as the opposite of illogical, irrational thinking (Facione, 2013). But one might argue that creative, meditative, or purposive thinking serve to the same proposit. It seems reasonable to affirm that critical thinking is part of what is considered “good thinking”, but it is not the only kind of it (Facione, 1990). So, by testing our understanding a little bit further, we will easily run into

questions that justify and claim for more clarity on this field, especially in regards to developing critical thinking as a claimed educational outcome in higher education.

‘Good reasoning’ is certainly in consonance with what bell Hooks (2010) calls “good education”: not just one that gives students knowledge and prepares them for a vocation, but also an education that encourages an ongoing commitment to social justice. I believe that education can contribute to social transformation, playing a fundamental role as one more key feature in the society’s rebuilding. As drawn by the literature review, critical thinking skills seem to be of paramount importance in this process.

However, the literature in the pharmacy field fails to identify or provide a version of critical thinking definition that would be suitable for the clinical practice adopted by the pharmacy profession. The philosophy of pharmaceutical care practice proposes a patient-centered approach and a caring paradigm that demand pharmacists to use different types of knowledge and skills as they work directly and take co-responsibility for the health of their patients.

In this new professional paradigm, pharmacists certainly face difficult choices concerning what is best for their patients, especially in this rapidly changing healthcare environment. It is no longer good enough to master pharmacological knowledge or to merely identify needs and demands of patients and healthcare organizations. Pharmacists are now expected to be able to analyze complex and singular situations and to make clinical decisions based on a wide range of knowledge – social, clinical, philosophical – and experiences. The ability to think critically, therefore, becomes paramount in this process of embracing the practice of direct patient care.

Perhaps this realization forms part of the basis for why society is currently demanding a broader range of learning outcomes from the educational system in general. Knowledge and skills cannot be the only staples of the educational philosophy that prepares healthcare professionals for the workforce anymore. There is a clear urge for a broader set of outcomes including habits of mind and dispositions, such as civic engagement, social responsibility and commitment to the common good that must be taken in consideration as we work to equip people to improve their own futures and become active members of society, as citizens and as healthcare professionals.

Critical thinking is about how one approaches problems, questions, issues. Becoming educated and sharpening the ability to make fair judgments does not absolutely guarantee a life of happiness, professional and financial success or virtue, but it might offer a better chance at those things. Experts affirm that “critical thinking is a pervasive and purposeful human phenomenon” (Facione, 2013) and that it is characterized not only by her or his cognitive skills, but also by how she or he approaches life and living in general.

So why did I decide to focus on critical thinking in the classroom? My opinion is in consonance with that of Strand & Morley (1987), when they stated that in order to train strong critical thinkers and proficient problem solvers it is absolutely essential to begin with a critical examination of the educational process itself. I agree with them and I am aware that critical thinking goes way beyond the classroom. In fact, many experts fear that some of the things people experience in school might be actually harmful to the full development and cultivation of strong critical thinking skills (Facione, 2013). So I could

not think of a better reason to conduct my research in this space that has always fascinated me and that offers such broad range of possibilities to either further those skills or hinder its development by PharmD students. Moreover, the findings of this study are not, by any means, a final report of how critical thinking skills are acquired by PharmD students. This research was an attempt to unveil the potential of the classroom as one more space likely to influence the development of those skills and dispositions.

Gibson (1998) affirmed that classroom interactions are asymmetrical relationships among the participants. However, there is enough evidence that the classroom can also be a space for dialogical exchange of knowledge, which ultimately stimulates the development of critical thinking skills and dispositions by both teachers and students (Austin, Gregory, & Chiu, 2008; Powers & Jones-Walker, 2005). I remained focused on this bilateral aspect of classroom activities throughout the entire course of this research. My goal was to engage in a process wherein the dynamic of the relationships among ideologies and practices in the classroom could be exposed and explored.

What should be taught and learned in pharmacy's classrooms seems to be clear from all the guidelines that are driving the PharmD curriculum in the United States. However, some important questions related to critical thinking in the pharmacy profession were still unattended when I decided to conduct this research:

- How does critical thinking emerge in pharmacy classrooms? And how is it being taught and learned in this environment?
- What are the underlying assumptions embedded in the pedagogical approaches adopted in the classroom and how these assumptions influence

students' critical thinking abilities in the classroom when it comes to patient care?

- What are students learning that teachers do not mean to teach in terms of political stance, values and assumptions that might influence the pharmacy students' ability and disposition to think critically when facing challenging issues related to patient care?

With those questions in mind, I grounded the research process on an ethnographic methodology informed by critical theory. My major goal with this research was to contribute to a body of knowledge that can transform the educational process to prepare healthcare students. If closely observed, the results of this study might help faculty and curriculum stakeholders to better prepare pharmacy students to use their skills to make meaningful contributions to patient's lives.

Education is, in a large part, a socialization process and, as such, it is not an end in itself. It serves to socialize individuals into a professional role and provides them with a social identity, shaping values, attitudes, and the broader dimensions of behavior that are appropriate to the group (Strand & Morley, 1987). Therefore, embracing Shor and Freire's perspective (1987), it seems fundamental that teachers and students understand that the educational process should not be an act of simply mastering "a manual of clever techniques". Rather, education should be taken as an opportunity to "critically reorient students [and teachers] to society", understanding that the social context of teaching and learning makes it a great opportunity for crafting social transformation. Critical thinking seems to be a fundamental skill embedded in this process.

Ultimately, I would like to acknowledge that the students' perspectives on teaching/learning critical thinking skills in the classroom were emphasized throughout the entire study. This was part of my deliberate effort to acknowledge students among those who have the knowledge and the position to shape what counts as education, to reconfigure power dynamics and discourse practices within current realms of conversation about education, and to reconstitute to students the political potential of speaking out on their own behalf (Cook-Sather, 2002).

By addressing the research questions listed above, I believe this study assisted in the unraveling the tangled web of personal beliefs and cultural perspectives on professional education, and traditional education ideologies which might inform teaching-learning practices in the pharmacy classroom nowadays. It was also part of the aims of this study to identify and discuss pedagogical practices that can foster life-long critical reflection skills, moving the students from an "empty vessels waiting to be filled" behavior (Freire, 1970) to introspection, self-authorship and commitment to a broader concept of health that fairly encompasses issues of social justice.

The knowledge emerged from this study can contribute to better prepare both teachers and students to experience the challenges implied in this process of bilateral socialization in regards to fostering critical thinking skills and dispositions. Even though I recognize that education cannot be changed in isolation, this research was born of my belief that efforts to improve the educational process are a fundamental part of a long term struggle to create a more equitable society.

Literature Review

We are currently facing the emergence of a new framework of information production, acquisition, and diffusion that is decisive for the way in which knowledge is created and retrieved. Information and technology are designing a 'global knowledge economy' in the different fields of human interaction. Healthcare professionals, in particular, are facing many challenges related to an increasingly complex health system. The more information these professionals can obtain, the more important it becomes to know how to judge its applicability and usefulness in a particular clinical context (Doherty, Hansen, & Kaya, 1999). The abundance of data and information requires a reasoning process where people have to assimilate and adapt knowledge in order to deal with situations where usually there is no single or absolutely correct answer (Fowler, 1998).

Besides that, it is also noteworthy that educational institutions are currently admitting a "changing learner". Some authors use the terms net generation, digital natives and millennials (Oderda et al, 2010; Prensky, 2001; Sandars & Morrison, 2007) to refer to the young people born between 1982 and 1991 who have grown up in an environment in which information and communication technologies have become an integral part of daily life. These young people are now entering higher education and there seems to be a widespread claim for a deep educational reform in response to this new challenge (Oderda et al, 2010).

Although this argument has been largely used to justify the need for a deep restructuration of the teaching-learning strategies used in higher education, there are

some points of contention in its midst. Bennett, Maton and Kervin (2008) agreed that a proportion of young people were highly adept with technology and relied on it for a range of information gathering and communication activities. However, as those authors further discussed, there was also a significant proportion of young people who did not have the levels of access or technology skills predicted by proponents of the digital native idea. The potential differences related to socio-economic status, cultural/ ethnic background and gender might actually play a role in establishing those differences.

Therefore, the potential variation within this new generation of learners regarding the use of technology and learning styles only adds up to the call for a deeper analysis of how our educational institutions are preparing professionals to respond to the society's needs and challenges in the near future. The characteristics of this heterogeneous learners' generation and the abundance of data and information available nowadays in the healthcare field have curricular implications as it relates to the structure and methods used in the professional curricula to prepare healthcare professionals. The ability to "think appropriately moved by reasons" (Siegel, 1988) seems to be a currently desired asset to those who enter the health field expecting to influence positively the outcomes in the healthcare system.

Critical Thinking – The Concept and Its Applications

According to Fisher (2001), people have been discussing critical thinking and have been researching how to teach it for more than one century. John Dewey, the American philosopher, psychologist and educator, is commonly regarded as one of the precursors of

the modern critical thinking tradition. He called it ‘reflective thinking’ and defined it as “active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it tends” (Dewey, 1938). His ideas about reasoning reverberate in recent conceptions of critical thinking, despite the fact that he never used this term per se (Bensley, 2011). Dewey was one of the first authors that brought the concept of reflective thinking to the education field, emphasizing that it should be integrated into content learning. He also emphasized the importance of fostering certain attitudes – or what many today call ‘dispositions’ – to a successful reasoning process (Dewey, 1910).

Since then, many other authors have developed an extensive body of knowledge regarding critical thinking and its importance for the current ‘state of the art’ in science and scientific knowledge (Freire, 1970; Hooks, 2010; Norris & Ennis, 1989). In the 60’s, educational philosophers such as John Passmore, Robert Ennis, Harvey Siegel and Maxine Greene explicitly attempted to connect the idea of critical thinking with the teaching and learning context (Portelli, 1994). Robert Ennis (1987) clearly built on Dewey’s work, defining critical thinking as “reasonable, reflective thinking focused on deciding what to believe or do” (p. 10). He went on explaining that critical thinking was not the same as the higher order thinking skills proposed in Bloom’s taxonomy of educational objectives (Bloom, 1956).

Bloom’s seminal classification was created with the objective to facilitate the exchange of information about curricular developments and evaluation devices. He identified three domains of educational objectives – cognitive, affective, and

psychomotor – and classified thinking according to six cognitive levels of complexity. Listed in hierarchical order, the major classes of objectives start from the simplest behavior to the most complex: knowledge, comprehension, application, analysis, synthesis, and evaluation. The categories were proposed as degrees of difficulties, where the first ones must normally be mastered before the next ones could take place (Bloom, 1956). In rejecting the direct association between critical thinking and Bloom's higher order thinking skills, Ennis (1987) emphasized that the later were too vague as they stood and that the taxonomy was not accompanied by a criteria for judging whether the activity was being conducted correctly.

Paulo Freire (1970) brought critical thinking to the field of social justice, highlighting its use in altering the nature of power relations. He wisely connected critical thinking with authentic dialogue between human beings, asserting that critical thinking is

thinking which discerns an indivisible solidarity between the world and the people and admits no dichotomy between them – thinking which perceives reality as a process, as transformation, rather than as a static entity – thinking which does not separate itself from action, but constantly immerses itself in temporality without fear of the risks involved. (p. 73)

As a consequence of this world-wide movement of applying and describing critical thinking in so many different fields, the differences of interpretation of the ideal of critical thinking became, obviously, more explicit and controversial. In 1990, as an attempt to address these issues of shared terms and conflicting meanings of critical thinking, the American Philosophical Association published a consensus statement – also known as The Delphi Project – regarding critical thinking and its purposes for educational assessment and instruction (Facione, 1990). In the document, they defined

critical thinking as “purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based”. (p. 3)

Along those lines, the Association of American Colleges and Universities (Association of American Colleges and Universities [AACU], 2010) also defined critical thinking as “a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion”.

Besides those cognitive skills (Figure 1) that are at the core of the critical thinking definition, the Delphi Project also reinforced a dispositional dimension of critical thinking (Figure 2), explicit when the panel defined an ideal critical thinker as:

inquisitive, well informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. (p. 3)

FIGURE 1: Critical thinking skills as listed in the Delphi Project (1990) and examples in pharmacy practice (adapted from Facione, 1990 and Oderda et al., 2010)

CT skills	Definition	Associated sub-skills	Example in Pharmacy
Interpretation	To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria.	Categorization Decoding significance Clarifying meaning	<ul style="list-style-type: none"> Identifying a drug therapy problem and describing why it is a problem.
Analysis	To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions.	Examining ideas Identifying arguments Analyzing arguments	<ul style="list-style-type: none"> Identify how the patient's medication experience might be influencing the adherence to the treatment
Evaluation	To assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intend inferential relationships among statements, descriptions, questions or other forms of representation.	Assessing claims Assessing arguments	<ul style="list-style-type: none"> Determining the credibility of a piece of drug literature
Inference	To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.	Querying evidence Conjecturing alternatives Drawing conclusions	<ul style="list-style-type: none"> Identifying potential adverse effects or drug interactions that could occur based on the use of a certain drug therapy
Explanation	To state the results of one's reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments.	Stating results Justifying procedures Presenting arguments	<ul style="list-style-type: none"> Describing the rationale behind the choice of one among several therapeutic alternatives that could be used to solve a drug therapy problem
Self-regulation	Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results.	Self-examination Self-correction	<ul style="list-style-type: none"> Checking one's self when listening to a patient to ensure that what the patient is saying is understood, free of one's own opinions or biases

Figure 2: Affective dispositions of critical thinking according to the APA Delphi Research Report

<p>APPROACHES TO LIFE AND LIVING IN GENERAL</p>
<ul style="list-style-type: none"> • Inquisitiveness with regard to a wide range of issues • Concern to become and remain well-informed • Alertness to opportunities to use critical thinking • Trust in the processes of reasoned inquiry • Self-confidence in one's own abilities to reason • Open-mindedness regarding divergent world views • Flexibility in considering alternatives and opinions • Understanding of the opinions of other people • Fair-mindedness in appraising reasoning • Honesty in facing one's own biases, prejudices, stereotypes, or egocentric tendencies • Prudence in suspending, making or altering judgments • Willingness to reconsider and revise views where honest reflection suggests that change is warranted
<p>APPROACHES TO SPECIFIC ISSUES, QUESTIONS OR PROBLEMS</p>
<ul style="list-style-type: none"> • Clarity in stating the question or concern • Orderliness in working with complexity • Diligence in seeking relevant information • Reasonableness in selecting and applying criteria • Care in focusing attention on the concern at hand • Persistence though difficulties are encountered • Precision to the degree permitted by the subject and the circumstances

Adapted from: Facione, P. A. (1990). *Executive Summary – Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*. Millbrae, CA: The California Academic Press.

It seems that authors are in agreement that critical thinking skills alone are not enough if one is not inclined to use them (Paul & Elder, 2002; Facione, 1990; Halpern, 1999). It only takes place when there is an attitude or disposition to recognize when a skill is needed and the willingness to exert the mental effort needed to apply it (Halpern, 1999). In her book “Teaching Critical Thinking – Practical Wisdom”, bell Hooks (2010) emphasizes that the core of critical thinking is the “longing to know” and, as so, it involves first discovering “the who, what, when, where and how of things” and then “utilizing that knowledge in a manner that enables you to determine what matter most” (p. 9).

Additionally, Paul, Elder and Bartell (1997) emphasize that critical thinking is a multi-faceted concept, involving the intellectual (logic, reason), psychological (empathy, self-awareness), sociological (socio-historical context), ethical (moral norms and evaluation), and philosophical (the meaning of human nature and life) dimensions. Its elements are deeply interrelated and interdependent, functioning as a complex of skills, practices, disposition attitudes and values.

Given the complexity of critical thinking – in terms of its rootedness in hundreds of years of intellectual history as well as its intricate definition and the wide range of its application – it would be unwise to put too much weight on any single definition of critical thinking. As contended by Paul, Elder, and Bartell (1997), “any brief formulation of critical thinking is bound to have important limitations” (p. 4). Nevertheless, although there are varying definitions for critical thinking, they generally reflect certain unique elements. Halpern (1999) affirmed that most definitions include the use of cognitive

skills or strategies that increase the probability of a desirable outcome. It seems to be an agreement between many prominent critical thinking theorists that critical thinking entails both the cognitive and affective domains of reasoning, and it is usually regarded as a composite of skills, knowledge and attitudes (Brookfield, 1987; Facione, 1990; McPeck, 1981; Paul, Elder, & Bartell, 1997; Siegel, 1988).

From these foundational characteristics, we can infer that critical thinking is not a method to be taught, but it is rather a process, an orientation of mind. Thus, it should not be fully regarded as a body of knowledge to be delivered to students as one more school subject along with biochemistry, pharmacotherapy or drug delivery. Halpern (1999) supported the idea that critical thinking skills that are transferable across several disciplines can be successfully taught upon deliberate effort. She contended that if the value of this skill set across disciplines is not made obvious, then it is likely that the learner will limit his/her skill development to the course(s) in which it is used, what is not desirable as an educational outcome. Critical thinking is generally associated with elements such as knowledge, active argumentation, reasoning, initiative, intuition, envisioning alternatives, analytic inferential skills, and openness to continuous exploration, redefinition, and understanding and, as such, it can be generalized across subject matter disciplines and a wide range of human activities (Halpern, 1999; Simpson & Courtney, 2002).

Critical Thinking and Pharmacy Education

The healthcare field obviously is not immune to the process of incorporating critical thinking expertise into the desired outcomes of its educational process. The dynamics of knowledge production and acquisition is placing increasing demand on flexible intellectual skills, and on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems (Bartlett & Cox, 2002; Case, 1994; Miller & Malcom, 1990).

Back in 1987, Strand and Morley stated that pharmacy education, at that time, was committed to a conservative goal to educate/ train individuals not so much to become agents of change, but rather to fit into the prevailing *status quo*. But time has changed – and so have the stakes. The discourse in pharmacy education has evolved. In July 1989, the American Association of Colleges of Pharmacy formed the Commission to Implement Change in Pharmacy Education whose task was to evaluate the role of Pharmacy in the future and to make recommendations to guide pharmacy education as it evolves to meet the changing demands of the profession, the healthcare system and society. The Commission declared a radical change in pharmacy practice, stating that “the mission of pharmacy practice is to render pharmaceutical care” (American Association of Colleges of Pharmacy [AACCP], 1989). Pharmaceutical care is a professional health care practice in which a practitioner takes responsibility for meeting a patient’s drug related need by preventing, identifying, and resolving drug therapy problems (Cipolle, Strand, & Morley, 2004). Two fundamental assumptions of pharmaceutical care – the clinical encounter between pharmacist and patient and the

collaboration with different members of the health care team – introduced different requirements in terms of skills and abilities needed to accomplish this new professional role.

Acknowledging the urge for changes in pharmaceutical education, Droege (2003) wrote that

[i]f practicing pharmaceutical care requires a shift in focus from drug product to patient, so does teaching future practitioners. The curriculum would have to address issues that go beyond didactic and experiential courses; it would also have to include environmental, cultural, and social components that can help to build a new conceptual framework of a professional practice. (p. 72)

Colleges and schools of pharmacy have responded to the call for the pharmaceutical education reform by implementing changes to promote the desired outcomes. Several accreditations standards have been created in order to better prepare pharmacists for teamwork practice in a scenario of direct patient care. In 1991, the Commission to Implement Change in Pharmaceutical Education published a background paper (AACP, 1991) that spoke directly to critical thinking in pharmacy education:

Although critical thinking is a universally desired educational outcome, professionals particularly need a repertoire of thinking strategies that will enable them to acquire, evaluate, and synthesize information and knowledge. Since much of professional practice is problem-solving, students need to develop analytical skills to make decisions in both familiar and unfamiliar circumstances. Critical thinking fosters a questioning attitude among professionals, and it is a prerequisite skill in making judgments.

Similarly, the Accreditation Council for Pharmacy Education (Accreditation Council for Pharmacy Education [ACPE], 2006) endorsed critical thinking in pharmacy curricula through several accreditation standards (11, 13, and 15) and guidelines (11.2, 13.3 and 15.1), in the “Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree”, adopted in 2006. Without defining what is meant by critical thinking, this document directs colleges and schools of pharmacy to use teaching, learning, and assessment methods to foster the “development and maturation of critical thinking skills”. Many authors in pharmacy education literature have articulated the wide variety of definitions of critical thinking (Miller, 2003; Austin, Gregory, & Chiu, 2008; Cisneros, 2009) and the diverse ‘flavors’ of this concept inside pharmacy makes its assessment even more challenging.

In 2009, the AACP Academic Affairs Standing Committee planned a Curricular Change Summit in order to identify and discuss 4 to 5 areas of critical importance in re-defining pharmacy professional curriculum for the future. Five white papers served as thought-provoking background material, providing elements for discussion (Blouin et al., 2009; Boyce & Lawson, 2009; Brazeau et al., 2009; Farris, Demb, Janke, Kelley, & Scott, 2009; Jungnickel et al., 2009). When asked to identify 1 or 2 key outcomes that each graduate should possess upon graduation, the summit participants concluded that the most essential educational outcomes ought to be critical thinking and problem solving skills (Oderda et al, 2010).

It is evident that pharmacy education has been placing an increasing emphasis on critical thinking as the profession transitions to a patient care role, but the question of

what critical thinking means in this context remains unanswered (Phillips, Chesnut, & Rospond, 2004). ACPE standards and guidelines stated that the development of critical thinking skills should be supported by the application of computerized and other instructional technologies, laboratory experiences, and experiential education. However, that institution did not provide a rationale for this requirement nor did the standards and guidelines provide specific examples of the way in which this outcome should be achieved, assessed, or demonstrated (Oderda et al., 2010). The challenge to teach and assess critical thinking as an educational outcome remains because standards of practice do not guarantee a well-prepared pharmacist, since the accreditation standards do not address how practice skills and knowledge must be integrated and applied in order to be effective (Losinski, 2010). Pharmacy faculty seems to agree that critical thinking skills are essential to the successful practice of pharmacy and that graduates should achieve and demonstrate an appropriate level of competency prior to graduation. Therefore, every effort should be made to establish consistent and measurable outcomes related to this skill set.

At the University of Minnesota College of Pharmacy, a document approved by the College Assembly in December 2006 (College of Pharmacy, 2006) describes the general ability-based educational outcomes to be incorporated ‘as appropriate’ throughout the curriculum. In this document, the first stated educational outcome is “thinking”, defined as:

Think critically, solve complex problems, and make informed, rational, responsible decisions within scientific, social, cultural, legal, clinical, and ethical contexts.

- A. Identify, retrieve, understand, analyze, synthesize, and evaluate information needed to make informed, rational, ethical decisions.
- B. Solve complex problems that require an integration of one's ideas and values within a context of scientific, social, cultural, legal, clinical, and ethical issues.
- C. Display habits, attitudes, and values associated with mature critical thinking.

Despite the clear importance of knowledge integration in a way that surpasses the “pure” scientific way of knowing, the adequacy of critical thinking training in pharmacy schools is still questioned. Even with all efforts put into designing a more reflective curriculum, critical thinking is still considered a challenging outcome to be obtained through the educational processes utilized to prepare future pharmacists (Cisneros, 2009).

In 2010, the AACP published a report of the 2009-2010 Academic Affairs Standing Committee entitled “An Environmental Scan of the Status of Critical Thinking and Problem Solving Skills in Colleges/Schools of Pharmacy”, where authors not only mentioned the critical thinking debates, but also provided a more solid description of methods to teach and assess critical thinking skills throughout the curriculum (Oderda et al., 2010). In this document, the committee recommended that

Colleges/schools of pharmacy should ensure that the development of critical thinking skills becomes the backbone of the curriculum, and that courses throughout the curriculum are designed specifically to provide students with the opportunity to obtain and use these skills, that the skills are assessed appropriately, and that the attainment of these skills are documented before the student is permitted to graduate. Assessment of this skill should be a formal component of preceptor evaluation of P4 students.

Assessing critical thinking

Educator Edward Glaser (1941) began the endeavor of assessing critical thinking and demonstrating that instruction could actually improve critical thinking skills. The development of the Watson-Glaser Critical Thinking Appraisal (WGCTA) launched the efforts to assess critical thinking with standard instruments, focusing primarily on argument analysis skills applied to everyday questions and situations. The WGCTA is an 80-item test that consists of 5 sub-tests that assesses the respondent's ability to make accurate inferences, recognize assumptions, properly deduce, interpret information and evaluate arguments. A student's raw score on this test is the total number of correct responses on these 5 sub-tests (Watson & Glaser, 1980).

Another formal instrument largely used in assessing critical thinking skills is the California Critical Thinking Skills Test (CCTST). The CCTST is comprised of 34 questions that assess one's overall critical thinking skill plus 5 subscales that assess specific areas: analysis, evaluation, inference, deductive reasoning, and inductive reasoning (Facione & Facione, 1994). Whereas CCTST measures skills, the California Critical Thinking Dispositions Inventory (CCTDI) measures a student's inclination to think critically. The index is comprised of a list of reflective statements with the application of a Likert scale for statement evaluation by the respondent. They relate to the 7 "habits of mind" that might impel us toward applying critical thinking skills: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness, and cognitive maturity (Facione, Facione, & Giancarlo, 1996). Both

CCTST and CCTDI are based on the Delphi Expert Consensus definition of critical thinking.

Nursing has an extensive array of literature referencing several standardized instruments used to gauge the development of critical thinking skills in graduate education (Adams, 1999; Behrens, 1995; Colucciello, 1997; Hicks-Moore & Pastirik, 2006; Profetto-McGrath, 2007). Using a qualitative approach, Cragg and Andrusyszyn (2004) examined and described changes in perspective experienced by 22 recent graduates of Master's in nursing programs from three universities in Canada. The authors sought to identify changes in knowledge, practice, and attitudes that students attributed to the graduate level study. Among the outcomes were personal accomplishments, including greater self-confidence, credibility, and acuity of critical thinking. Emerging themes included “increased breadth and depth of understanding, development of higher order skills in cognition, relationships, and research, increased self-confidence, and a sense of professional pride”.

Other healthcare professions have also been active in searching strategies to improve the delivery and assessment of critical thinking skills inside their curriculum. Bartlett and Cox (2002) measured changes in critical thinking skills and dispositions in physical therapy students over academic and clinical portions of the second year of the program. Authors reported modest improvement in deduction and significant changes in truth-seeking and self-confidence dispositions subscales. Scott, Markert, and Dunn (1998) examined changes in WGCTA scores of 68 medical students from program entry to end of the third year of study. Authors report modest but statistically significant

improvement in students' WGCTA scores. The WGCTA was also modestly correlated with performance on the US Medical Licensing Examination, according to the findings of that study.

In spite of accreditation standards, the literature reporting the use of standardized instruments to gather information about critical thinking of PharmD students is not extensive. Pharmacy has often tried to assess student's critical thinking by using assignments that require those skills in didactic coursework; observing students in clinical settings, evaluating students' performance on written patient assessments, care plans, portfolios, capstones exams, and thesis projects (Phillips, Chesnut, & Rospond, 2004). While these are valuable measures of program effectiveness, they are subject to threats to reliability and validity. In addition, non-standard measures cannot be used to compare students across courses, programs, or disciplines.

According to Oderda et al. (2010), the instruments most commonly used to assess critical thinking skills in pharmacy include the WGCTA, CCTST, CCTDI and the Health Sciences Reasoning Test (HSRT). These instruments have been mostly applied in admissions (Adams, Leader, Jain, & Lawrence, 2008; Allen & Bond, 2001; Cox, 2008; Zerilli & Cicero, 2009) and assessment of PharmD students' performance (Miller, 2004; Miller, 2003; Cisneros, 2009).

Allen and Bond (2001) and Kidd and Latif (2003) found the scores on CCTST to be a good predictor of performance in practice-based courses. Lobb et al. (2006), on the other hand, found no correlation between students' performance on the WGCTA and

subsequent academic performance. It is important to mention that, in all of these studies, the subsequent academic success was measured by grades and not critical thinking *per se*.

Cisneros (2009) reported that a study of CCTST and CCTDI given to 137 pharmacy students from years 1, 2, 3, and 4 of the professional curriculum showed no incremental change over one academic year. However, the author identified significant ($p < 0.05$) changes in the subscales inference (CCTST, P3 subjects' scores decreased), open-mindedness (CCTDI, P4 subjects' scores decreased), and self-confidence (CCTDI, P2 subjects' scores increased).

Miller (2003) employed both the CCTST and CCTDI in assessment of the development of critical thinking ability and disposition during a 4-year professional pharmacy program. The author reported an increase in the CCTST scores as students progressed through each year of the curriculum, with a 14% total increase by graduation ($P < 0.001$). However, the study reports no change in CCTDI performance over the years of pharmacy school. As the author points out, "a mere increase in the ability may be of no practical value if a pharmacist is not willing or able to use their skill without specific prompting or in novel situations" (Miller, 2003). This same author pertinently questioned whether the CCTST is based on scenarios that are similar to those ones pharmacy students will encounter in real life.

Although the CCTST requires no discipline-specific knowledge and is set in contexts familiar to college-aged students or older, it might not specifically assess application of skills in pharmacy contexts. Up to date and to the best of my knowledge, there is no published attempt to discuss critical thinking definition and components that

would best serve pharmacy profession. As means of comparison, Scheffer and Rubenfeld (2000) published a “Consensus Statement on Critical Thinking in Nursing”, identifying and defining 10 affective components and 7 cognitive components of critical thinking that best reflected the views of a diverse group of nurse experts.

Conclusions about the development of critical thinking skills and dispositions in PharmD students based on published studies are tentative at best because of the paucity of studies, relatively small sample sizes and variety of instruments used in this assessment. Moreover, existing instruments may be of limited use because they focus on the measurement of formal logic and general thinking skills, as suggested by Miller (2003).

Critical Thinking and the Classroom

Educators generally believe that greater education fosters growth in thinking (Seldomridge & Walsh, 2006). However, this ratio seems far from representing a direct correlation. Paulo Freire (1970) and Ira Shor (1992) share the vision that education has the potential to either liberate or domesticate. In other words, it can be translated, in practice, into a process of learner’s growth in the habitus of mind characterized by the critical thinking skills and dispositions or it can result in the reinforcement of intellectual and social passivity. It is also important to highlight that educators, curriculum stakeholders, and educational policy makers each have a vested interest in developing professionals, but also in unreflectively maintaining the *status quo*, professional biases, and personal assumptions (Ira Shor, 1992; Strand & Morley, 1987). To come to this

conclusion is to realize that the social context that permeates our lives is reproduced in the microcosm of the classroom.

When teachers and students enter the classroom, they bring their relative positions in the social hierarchies that 'order' the world, including those based on race, sex, gender, sexual orientation, social class background, religion, ethnicity, age, nation of origin, and physical ability (Cannon, 1990; Hooks, 1994; Johnson-Bailey & Cervero, 1997). Therefore, the politics of everyday life matters. Besides that, the number of students and the physical organization of the classroom are also structural dimensions that strongly influence classroom interactions (Cannon, 1990). It is possible that any or all these factors have an impact on critical thinking skills development in the classroom. Critical thinking goes way beyond the classroom and, in fact, experts fear that some of the things people experience in school are actually harmful to the development of strong critical thinking abilities and dispositions (Facione, 2013).

It is certainly a challenge to teach critical thinking skills and, to date, studies of the effectiveness of particular teaching strategies to enhance a student's ability to think critically are largely anecdotal in the pharmacy education field (Austin, Gregory, & Chiu, 2008; Lin & Crawford, 2007; Powers & Jones-Walker, 2005; Ross et al., 2007; Zdanowicz, 2009). The AACP Academic Affairs Standing Committee, analyzing how this issue has been addressed by colleges and schools of pharmacy, admitted that little has been published on teaching critical thinking throughout the curriculum (Oderda et al., 2010). This same committee stated that there are specific instructional methods considered effective in the development of critical thinking and problem solving skills.

These methods tend to be learner-centered and inquiry-based, employing team/group learning activities, technology based tools and reflective writing in both didactic and experiential learning components of the curriculum.

Cisneros, Salisbury-Glennon, & Anderson-Harper (2002) outlined specific gaps in our knowledge about the effectiveness of various instructional methods for the development of problem solving skills and called for additional research in these areas. Their suggestions included conducting more longitudinal studies of inquiry-based instructional methods, making comparisons to control groups, comparing across different schools, examining the effects of different types of problem-based learning (PBL) programs on different types of learners, exploring the role and effect of group dynamics on learning and achievement, and using both quantitative, qualitative and mixed-methodological research in order to more fully understand the effects of PBL on the students' achievements.

When the idea of fostering critical thinking comes to pedagogical practices in the classroom, the issue of power cannot be overlooked. Briskin (1995) contends that power is always part of the curriculum, but the most resonant dimensions of power dynamics, though, will vary historically and contextually. The general idea embedded in most of pedagogical processes is that education is the surest route to freedom and teachers are the guides responsible to show the students the way to 'liberty' of thinking (Hooks, 2010). Although it is still commonplace to find teachers who appear to be comfortable with the idea of exercising their authoritarian power over students (Hooks, 1994; 2010), the discourse of power relationship in the classroom has changed. We have moved away

from the static and unilateral theoretical concept of power as something teachers have over their students, acknowledging the ways that power is mutually constructed and negotiated between teacher and student, as well as between students (Manke, 1997).

Himley (1997) affirms that "power is best understood as a multiplicity of force relations that are immanent, constitutive, relational, and dynamic" (p. 58). Linda Briskin (1995) states that naming the practices of power can be very unsettling for those who benefit from them and even for those who does not enjoy a direct benefit, but have developed a comfortable acceptance of and familiarity with them. However, the advantages of disrupting these power dynamics in the interests of learning and social change surmount. I believe that making a deliberate effort to focus on the effects of these power dynamics on critical thinking skills' development in classroom can open up possibilities for re-organizing this space and creates the foundation for vibrant teaching and learning experiences.

Methodology and Methods

This study built on ethnographic methodology informed by critical theory. As stated by Street (1992), ethnography can be conceptualized within different understandings of research development, and illuminated by different knowledge needs. So the kind of question posed is what determines the type of appropriate methodology to be employed. Joe Kincheloe and Peter McLaren (2005) reminded us that it is difficult to define critical theory, given the plurality of nuances that inform this field of knowledge, the evolving character of the critical tradition, and the inner desire – embraced by critical theorists – to avoid the production of “blueprints of sociopolitical and epistemological beliefs” (p. 303). With that stated, I did not attempt to provide an extensive explanation of the foundational principles of critical theory. Instead, what I describe in the following lines is the ‘take’ on critical theory that informed the conduction of the present research based on my readings of Britzman (2003), Brookfield (2005) and Kincheloe and McLaren (2005):

- All thought is fundamentally mediated by social and historically constituted power relations.
- There are imbalances of power and privilege in any society and the oppression of certain groups is a remarkable characteristic of contemporary societies. Critical theory, by its term, is concerned to provide people with the knowledge and understanding intended to free them from oppression.
- Oppression has many faces and focusing on only one at the expense of others often contributes to obscure the interconnection among them.

- The domain of values and ideological inscription can never be extracted from observed facts. Similarly, there is no separation of subject and object, of researcher and focus of research in critical inquiries.
- The relationship inside binaries such as signifier and signified or knower and known is never fixed or stable and it is often mediated by social relations of capitalist production and consumption.
- Language is central to the formation and expression of subjectivity. “Language can mask and illuminate, and also affirm and challenge, how we understand our social conditions” (Britzman, 2003, p. 35). It has the potential either to reproduce given realities as immutable and ubiquitous or to produce critiques that can potentially construct new realities. Researchers should attempt to move beyond the conversation itself to attend to the conditions of its production: the words they choose, the way they inflect them with past and personal meanings, the style used to position meanings, and the mix of intentions are inevitable components when subjects interact. Critical theorists move away from the normative view that language is merely neutral and descriptive to the dialogical view of language as ideological and politically charged.
- The mainstream research practices are generally – even though often unintentionally – implicated in the reproduction of systems of class, race, and gender oppression.

Kincheloe, McLaren, and Steinberg (2011) affirmed that, by adding the critical instance to the traditional roles of description, interpretation, or re-presentation of a slice

of reality, the critical ethnographer accepts the challenge of “moving beyond simply the reanimation of local experience” as an accepting celebration of cultural differences. I found critical ethnographic inquiry to be a suitable methodology to be used in this study, because it equipped me with systematic methods for taking cultural interpretation as the central purpose of my study (Wolcott, 2008). Moreover, this methodology was well aligned with my ultimate goal to understand the process of teaching and learning critical thinking mediated by issues of power dynamics in pharmacy classrooms.

By using critical ethnography as the overarching methodology in this research, I acknowledged and embraced the complexity of the relationship between teachers and students and the importance of valuing the entanglement of different perspectives and contexts of the subjects. Two questions – part descriptive and part interpretive – shaped this study: 1) How critical thinking in pharmacy was being taught and learned in the classroom? 2) What were the underlying assumptions embedded in the approaches to teaching and learning and how these assumptions influenced students’ critical thinking abilities when it comes to patient care? These questions were ethnographic because they required my presence in the world of students and professors for the purpose of understanding their daily interactions in classrooms and how those interactions interplayed with specific issues of power dynamics and critical thinking.

But, as recommended by Paulo Freire (1970), I did not enter this world as an empty vessel passively open to the deposit of factual information from the field. Indeed, throughout my journey, I have been a graduate student, a health practitioner, a teacher and a PhD student. These positions have inevitably shaped my present understanding of

interactions that took place in the classroom. My purpose, then, was not to merely describe what happened when somebody tried to teach somebody else how to think critically and how power relationships have influenced this process from students and teachers' perspectives.

As an ethnographic study, this research built upon the perspectives and experiences of its central subjects: students, faculty – including university professors and course directors, teacher assistants, lecturers, and other members of the Professional Education Division at the College of Pharmacy – and myself, the researcher. Therefore, unlike traditional ethnographers who enter the familiar world and linguistically render this experience strange, my purpose was to take the familiar story of learning critical thinking skills in an environment typically characterized by power imbalances and render it problematic through cultural critique and by asserting multiple voices (Britzman, 2003). I made those multiple voices explicit in the construction of the results. I strived to identify and present the multitude of perspectives instead of accepting consensus and agreement as the only ways to understand or validate the findings.

As wisely stated by Kincheloe and McLaren (2005), every research that aspires to be named “critical” must be connected to an attempt to confront the inequalities of a particular society or community. Critical ethnography, then, begins with an ethical responsibility to address processes of unfairness or injustice within a particular lived domain. In this sense, critical researchers are never satisfied with merely increasing knowledge. Upon detailed analysis, the knowledge that emerges from this modality of research can help those subjects involved in the investigation to probe other possibilities

in challenging institutions, regimes of knowledge, and social practices that limit choices, restrain meaning, and blur identities (Kincheloe & McLaren, 2005; Madison, 2005). I made deliberate efforts in this study to involve the participants beyond the data collection stage and to work with them to deepen not only mine, but our understanding of the process of teaching and learning critical thinking. I offered a detailed description of the strategies I adopted to meet that goal in the section “Data Analysis”.

Juxtaposed with the descriptive and interpretive questions previously posed, I also addressed the following critical question: What were students learning by the interactions in the classroom in terms of political instance, values and assumptions that guide or influence the critical thinking abilities in the healthcare field? The questions I raised concerned the complex relationship between learning to think critically and the capacity to transform the experience of learning this subject at the professional level through a deep commitment to personal thoughtfulness, and openness to difference, contradictions, risks, and change.

Moreover, I was deeply committed to sophisticate the discussion of binary approaches that frequently lead us to classify a teaching-learning pedagogical approach as good or bad, and liberatory or traditional. I focused on the underneath struggles of power relationships in the classroom and their impact on the student’s abilities to think critically about issues related to patient care. I did not have the intention to classify instructional methods as good or bad for the purpose of teaching critical thinking. Instead, I decided to focus on the circumstances that might have influenced the outcomes in the classroom. The methods used were only one of those circumstances that I further

discussed in the Results section. According to Madison (2005), the critical ethnographer should strive for a research process where the findings go beyond surface appearances, disrupting the status quo and unsettling both neutrality and taken-for-granted assumptions by “bringing to light underlying and obscure operations of power and control” (p. 5).

My questions were characterized by inquiry rather than judgment or evaluation. My interactions with the subjects were meant to invite them to be part of the research process. Throughout the entire process, I remained curious and enthusiastic to learn from the participants’ descriptions, interpretations and theories about their experience teaching, learning and applying critical thinking skills in the classroom. I also focused on issues related power dynamics – including, but not limited to: grading, conflicts between teaching and research, and classroom hierarchies – and how they interplayed with the process of thinking critically when students allegedly learn – and teachers supposedly teach – to care for patients.

Research Methods and Design

This study was designed to describe and analyze pedagogical practices in pharmacy classrooms through the process of in-depth engagement in classroom activities that took place in several courses at the University of Minnesota College of Pharmacy. The fieldwork engagement through participant observation lasted the entire Spring semester of 2012. Fieldwork engagement is intrinsically associated to ethnographic methodologies. Also, it is my belief that an examination of educational practices that attempted to

challenge the contradictions in knowledge, action, and reflection needed to begin with thick descriptions of student-professor interactions in the classroom.

Ethnography is notoriously eclectic in its employment of multiple methods of data collection (Wolcott, 2005). Since the main interest embedded in this proposal was to unfold the layers involved in teaching and learning critical thinking skills in classrooms focused on patient care, I initially proposed to conduct participant observations on the following courses:

- 1st professional year (PD1): Phar 6112 Practice of Pharmaceutical Care II
- 2nd professional year (PD2): Phar 6174 Pharmaceutical Care Skills IV
- 3rd professional year (PD3): Phar 6124 Pharmacotherapy IV: Patient-Centered Pathophysiology.

The course directors of the three aforementioned classes agreed with my presence in their classrooms. The 4th professional year (PD4) was not included in this study because the last year of the Pharmacy course is dedicated to Advanced Pharmacy Practice Experience, which occurs in diverse pharmacy practice scenarios, outside the classroom. The courses were selected based on their clear statement of focus on patient care and also based on the intention of observing a variety of teaching and learning environments and practices at the university (classrooms and laboratories, lectures and practical activities). As I started the participant observation and informal interviews with faculty and students, they emphatically suggested that the course Phar 6135 Pharmacy Outcomes was incorporated in my study. According to them, that course – taught to PD3 pharmacy students – would broaden my understanding of classroom activities associated with

critical thinking skills. So I accepted their suggestion and, upon the course director's approval, Phar 6135 Pharmacy Outcomes was also included as a site for participant observation in this study.

Fieldnotes were an important part of the process of data collection. During the observation time, I would jot down key words or phrases and, immediately after class, I would use them to construct evocative descriptions of the scenes observed. Also, as part of the participant observation process and whenever possible, I frequently engaged in informal conversations with students during the class breaks. I would ask them questions about the pedagogical approaches adopted in class, their opinion about the class dynamics, exams, and their preferred ways to learn and I would jot down notes about those conversations as well.

As highlighted by Wolcott (2005), the primary goal of ethnographers when writing fieldnotes is to describe rather than to analyze. However, according to Emerson, Fretz, and Shaw (1995), it is expected that as the researcher participates in the field, she inevitably begins to reflect on and interpret what she has observed and experienced in the in that specific setting. So, in order to capture these ponderings, reflections, and insights and make them available for further thought and analysis, I also pursued several kinds of analytical writing that stood in clear contrast to the descriptive writing. These analytic, "in-process memos", as called by those authors, were products of a more concentrated effort to identify and develop analytic themes while I was still actively engaged in the field and writing fieldnotes. Besides that, I also kept a reflective journal, a registry of my self-conscious reflections on the ideological and epistemological presuppositions that

informed my research as well as my subjective perspective as a researcher and the normative reference claims throughout the research process (Emerson, Fretz, & Shaw, 1995; Kincheloe & McLaren, 2005).

In depth-interviews (Rubin & Rubin, 2005) were conducted with key-informant students, professors, course directors and stakeholders in pharmacy education at the University of Minnesota College of Pharmacy, in both Twin Cities and Duluth campus. The interviews with faculty and students were conducted towards the end of the fieldwork in the Spring semester of 2012 and throughout the Fall semester of 2013. I chose to conduct the interviews with those subjects at the end of the fieldwork because at that point I had not only developed more rapport with them, but I also had a better understanding of the activities and behaviors that were taking place in the classroom. I used those interviews as a way to fill in information blanks and either clarify, problematize, or deepen the insights gained during participant observations.

I started the interviewing process by inviting course directors that accepted my presence in their classrooms, students that were registered in those classes, and curriculum stakeholders from the Professional Education Division at the College of Pharmacy to participate in a 45 to 60 minutes interview. For those who accepted the invitation and volunteered to participate, I scheduled face-to-face interviews in a place and time most convenient to them.

Some students manifested the desire to participate, but we could not agree on a convenient date and time for the interview. Others were interested in seeing the questions beforehand and taking more time to answer them. In those specific situations, students

agreed to participate in a written interview. The main questions asked in the written interview were the same ones asked in face-to-face student interviews. I either handed the written questions to the students in person or through email. Most participants that agreed to participate in a written interview emailed me their answers within two weeks.

During face-to-face interviews, I generally asked more questions when a concept was not clear in the participant's discourse. However, in the written interviews I did not have the same opportunity. I quickly realized that, with the written interviews, I would eventually need to clarify a concept or idea that was not clearly explained in the participant's written response. All the students participating in the written interviews volunteered to answer clarification questions as needed. I used this opportunity several times during this research.

Rubin and Rubin (2005) affirmed that in-depth interviews involve formulating three types of questions: main questions, probes, and follow-up questions. The main questions should address the overall research problem and structure the interview. Probes help manage the conversation, clarify ambiguity, and elicit detail. Follow-up questions should be formulated to pursue themes or explore the implications of ideas that emerged during the interview. I began my interviews with professors, teaching assistants, and lecturers by asking them general questions about the course they were teaching. Some examples of the questions I asked were: For how long they have been teaching this specific class? Could you briefly explain me what you teach in that class? How does this content relate to the PharmD program? Those easy and not threatening questions had the objective to start the conversation and make the interviewee feel more comfortable with the

interviewing process. Then, I introduced the main questions, which revolved around three main points: What does critical thinking mean to you? How do you incorporate it in your teaching? What does foster and what does hinder critical thinking in the classroom, in your perspective? I used probing questions after the answers provided by the participants, remaining open to what they wanted to teach me. I asked for concrete examples and description of situations in the classroom that could illustrate their point. I was also curious to learn their perspective on what would be the ideal situation to teach critical thinking in the classroom. For those faculty members whose classes I observed, I frequently sought to clarify issues about specific situations that happened in the classroom. I followed up on new concepts introduced by the participants and I asked for explanations. I delved into taken-for-granted ideas and I checked on contradictions when I could identify them during the interviewing process. I finished every interview asking if the participant would have any suggestions of somebody else – faculty, student or curriculum stake holder at the College of Pharmacy – knowledgeable in critical thinking to whom I should talk.

Both face-to-face and written interviews carried out with students followed the guide presented in Appendix I. I also used probing questions to gather concrete examples and I asked participants to elaborate or clarify unclear concepts during the face-to-face interviews. In the written interviews, I would receive the responses from the students, read it, and reply with any questions I would have about what they wrote.

The interviews with curriculum stakeholders followed the same format of those ones with faculty members. I started by asking questions about their roles at the College

of Pharmacy, including, whenever appropriate, their participation in committees related to professional education issues. The main questions were related to the concept of critical thinking and their ideas of fostering and hindering factors inside the PharmD curriculum and I used probing and follow up questions to deepen on the interview topics. I asked about their perceptions of what would be the ideal condition to make sure critical thinking is an educational outcome of the pharmacy curriculum. I finished the interview by asking for suggestions of other curriculum stakeholders, faculty or students at the College of Pharmacy that they considered knowledgeable about critical thinking.

I also conducted three focus groups with students from the first, second, and third professional year (Appendix II). Two of these focus groups occurred in the Twin Cities campus and one of them took place in Duluth campus. According to Stewart, Shamdasani, and Rook (2007), multiple groups are recommended since each discussion is highly influenced by who is involved and the comments that emerge. The purpose of the focus groups was to develop a broad understanding of issues related to developing critical thinking abilities, as they are taught/ required in the classroom.

I announced the three focus groups in each class I was observing. I worked closely with the class representatives to identify the best dates and times when students would likely be less busy with classes and exams and I set three dates to conduct the focus groups. The class representatives suggested that lunch time was probably the most strategic time to conduct the focus groups and that the provision of lunch could increase students' participation. I followed their advice. I prepared a signing sheet where students who were interested in participating would register their name, contact information and

the most convenient date and time for their participation and I shared this list with all the classes observed.

Each focus group lasted one hour and the students who volunteered did not receive any financial compensation for participating, but they were offered lunch boxes. I counted on the collaboration of a fellow graduate student who sat in all the focus groups and took notes about the discussions. Her notes were later incorporated in my data analysis. My PhD adviser, Dr. Ramalho-de Oliveira, observed the conduction of the first focus group and gave me feedback on my performance as a moderator. During the focus group conduction, I was attentive not only to the content of the group discussions, but also to the emotions, ironies, contradictions, and tensions expressed by the students (Krueger & Casey, 2009). I remained sensitive to how the social norms played out in the context of the collective, semi-public nature of this methodology and I registered my reflections in my research journal.

In addition to participant observation, reflective journal, in-depth interviews and focus groups, I also used document analysis as a mean of data collection. Departmental brochures, the syllabi and curricular materials used in each of the classes included in this study were collected and examined, depending on its relevance to the issue under scrutiny and the instructor's permission. As stated by Tisdell (1993), document analysis in the educational field contributes to the further understanding of what counts as knowledge, normal, natural or relevant in higher education. It is also a way to unravel the subtle but powerful messages in curricular materials with regards to oppressed groups – such as women and minorities – which may affect the nature of power relations in classrooms.

Data Analysis

The transcripts from the interviews, focus groups, and fieldnotes were analyzed in an ongoing process throughout all the research period. I used the qualitative data analysis software NVIVO 10, which allowed me to collect, organize, analyze the content from all interviews, focus groups, and fieldnotes. It provided me with search, query, and visualization tools that facilitated the process of data analysis. The analysis followed that one described by Emerson, Fretz, and Shaw (1995). I uploaded all the collected materials – written and audio documents – to the software and, initially, I read and listened to the files multiple times to construct an understanding of the data as a whole, as it had evolved over time. I would use the feature “Memos” in NVIVO 10 to register general insights about the data throughout this process. Then, I elaborated and refined earlier insights and hunches by submitting this entire record of fieldwork to close, intensive reflection and analysis. In this stage, some questions posed by Emerson, Fretz, and Shaw (1995) were very useful:

- What are people doing? What are they trying to accomplish?
- How, exactly, do they do this? What specific means and/ or strategies do they use?
- How do members talk about, characterize, and understand what is going on?
- What assumptions are they making?
- What do I see going on here? What did I learn from these notes?
- Why did I include them? (Emerson, Fretz, & Shaw, 1995, p. 146)

During this process, I identified several themes that, even though well explained by the participants, were still not clear to me. Specifically, I pondered how to interpret that information that was shared with me in a way that would be as inclusive and comprehensive as possible. Parallel to that, my concerns about the power dynamics in the research process were still populating my thoughts. I wanted this research process to be as democratic and informative as possible not only to me, but to all the participants involved. So I decided to seek volunteers that would be willing to learn more about the data I have collected and that would agree to share their insights about specific excerpts of interviews and fieldnotes with me. I called this strategy the peer analysis collaboration. Essentially, I was interested in establishing a collaboration in the analysis process with students, faculty, and curriculum stakeholders that would be interested in learning and sharing more insights about critical thinking in pharmacy classrooms.

I shared this possibility with all the participants and I asked them to contact me through phone or email in case they would like to take part in the peer analysis collaboration. I also personally invited two curriculum stakeholders to participate. The reason why I decided to invite them was that their names were mentioned by other participants as potential subjects for an interview. However, I reached data saturation before having the chance to interview them. Therefore, I decide to use the peer analysis collaboration as an opportunity to include their perspective in this research. One out of two invited curriculum stakeholders agreed to participate. Two students also volunteered to participate and were included in this study as peer analysts collaborators. None faculty member volunteered to participate.

In the peer analysis collaboration, I would share part of a transcript – a maximum of two single-spaced pages, without any participant’s identifiers – with the collaborator. I offered them access to more information about the data in case they would like to read the entire interview/document. I posed the following question at the end of each shared excerpt: “What do you see in this excerpt that might be relevant in the context of pharmacy education? Feel free to comment on any issues you might have identified in this excerpt”. Then I would ask them to write their insights about that piece without page limit. I reassured them that their insights would be kept confidential and their names would not be associated with any information or comment provided. The three peer analysts provided me feedback within a week from the date I shared the excerpts with them. Each peer analyst analyzed one to two excerpts and all of them volunteered to answer clarification questions if needed. Their comments were clear and I did not need to ask further questions. Their insights were incorporated in the analysis process.

Parallel to the peer analysis, I kept following the analytical steps suggested by Emerson, Fretz, and Shaw (1995). The next step was to combine the close data reading with procedures of analytically coding fieldnotes on an ongoing basis. This process proceeded in two different phases: 1) the open coding, when I read the fieldnotes line-by-line, and I used the feature “Nodes” to mark the main ideas or topics that emerged, no matter how varied and disparate they were. This work was subsequently revised, with the objective to identify “key”, “rich” or “revealing” incidents that are especially informative to the research questions. I also kept writing reflective entries using the “Memos” feature to help me achieve a better grasp of the data.

Then, all the codes and the respective statements were reviewed and combined if they would overlap or share meaning. In a process called “focused coding” by Emerson, Fretz, and Shaw (1995), I submitted again the entire body of fieldnotes to fine-grained, line-by-line analysis on the basis of topics that have been identified as of particular interest to answer – or better frame – the research questions initially proposed. Here I used the features “Nodes”, “Child Nodes”, and “Relationships” to group similar themes into sub-categories and major categories and to establish the connections between them. I used then a smaller set of promising ideas and categories to construct the major topics and themes for the final ethnographic account that were presented in the Results section of this study.

Assuring Quality in Critical Ethnography Research

A high quality ethnographic research must be consistent with all the well-established criteria for ensuring quality of qualitative research, such as credibility, confirmability, dependability, transferability, and triangulation (Lincoln & Guba, 1985). Besides that, the meticulous documentation of the entire research process, the methodological coherence and the prolonged engagement in the field are also considered important steps to ensure the reliability of qualitative research, in general (Mayan, 2009).

I engaged in those standard practices associated with what Lincoln and Guba (1985) called the "trustworthiness" of ethnographic research. Nevertheless, my agenda of social critique and my attempt to locate the respondents' perspectives in a larger system of

political struggles raised validity issues beyond those of the mainstream naturalistic research.

In addition to all the efforts in producing a “good” ethnographic research, Deborah Britzman (2003) wisely reminded us that “the retelling of another’s story is always a partial telling, bound not only by one’s perspective but also by the exigencies of what can and cannot be told” (p. 35). In this sense, even using all the good intentions, excellent craftsmanship, and all the techniques available to ensure the reliability of a given qualitative study, representing ‘others’ is always a complicated and contentious undertaking. As Madison (2005) stated, the way the researcher ‘re-presents’ the participants and the implications of the researcher’s message matter because “how people are represented is how they are treated” (p. 4).

Burgois (2002), in a strong critique of the politics of representation in ethnography, emphasized that ethnographers should strive to write about confronting power relations in “flesh and blood”, resisting to their privileged intellectual habits and forcing themselves to violate the apartheid of their society and write about social injustices in a comprehensive language. This is the first point of quality for which I strived for in this research. Under the capstone of quality in critical ethnographic research, then, I decided to focus on the strategies that I would use to ensure that my research was in conformity with the foundational principles of critical theory. By doing so, I intended to assure not only the quality of the collected, analyzed and presented data per se, but also the usefulness of this study in advancing and questioning issues of power dynamics and authority in the realm of the scientific knowledge.

A key component in assuring quality in any critical inquiry is the ability to maintain a high level of self-reflection and collaborative analysis to achieve desirable changes in the field of study. The exploration of the intense ‘self-other’ interactions that usually mark the fieldwork and mediate the production of critical ethnographic narratives is another highly desired attribute of sound critical investigations (Foley & Valenzuela, 2005; Street, 1992). This process not only requires a reflexive relationship between the data and the researcher, as advocated by Madison (2005) and Mayan (2009), but also requires reflexivity with the research participants (Street, 1992).

In this study, the research participants were invited to collaborate with me in the process of data analysis. I offered access to the data collected and, according to their willingness, they became collaborators in a reflexive process of investigation, bringing their insights and understandings as we move forward, deepening our understanding on the knowledge produced. This process is intended to be a form of self-critique and ideology critique, reinforcing the intention to work the divide between the powerful and the powerless in the research process (Foley & Valenzuela, 2005).

This openly ideological nature of data analysis in critical ethnography suggested that this research was not intended to be *about* the subjects involved in designing, applying and living the pedagogical practices in pharmacy, but it was expected to be conducted *with* them. Noblit, Flores, and Murillo (2004) stated that the experience as critical ethnographer is essentially constituted by “traveling those blurred boundaries when Other becomes researcher, narrated becomes narrator, translated becomes

translator, native becomes anthropologist, and [recognizing] how one emergent and intermittent identity continuously informs the other” (p. 166).

Positionality is another crucial issue related to quality in critical inquiries. Noblit, Flores, and Murilo (2004) affirmed that critical ethnographers must explicitly consider how their own acts of studying and representing people and circumstances are acts of domination, even when they reveal the same in what they study. Madison (2005) added that researchers should contextualize their own positionality – acknowledging their power, privilege, and biases – and thus making it accessible, transparent, and vulnerable to judgment and evaluation. In doing so, researchers are more likely to invite “an ethics of accountability by taking the chance of being proven wrong” (Madison, 2005, p. 8). I strived to position myself during the construction of the results of this study and to acknowledge my limitations as a researcher. I also maintained a dialogical approach while analyzing the data in collaboration with the peer analysts. I respected and preserved their perspectives and I held them to the same level of importance of my own perceptions.

Finally, I consider important to discuss the difficulties of assuming a critical voice in rearticulating the tensions between and within words and practices in my field of research. Uma Narayan (1988, p. 38) provided helpful insights on this topic when discussing about ‘methodological humility’ and ‘methodological caution’. Methodological humility requires the listener to “sincerely conduct herself under the assumption that, as an outsider, she may be missing something, and that what appears to be a mistake on the part of the insider may make sense if she had a fuller understanding

of the context”. Similarly, methodological caution requires the listener “carry out her attempted criticism of the insider’s perceptions in such a way that it does not attempt to, or even seem to amount to, an attempt to denigrate or dismiss entirely the validity of the insider’s point of view”. In summary, quality in the present study was taken not only as “correct instrumentation”, but also as a matter of the proper use of the study in itself as an instrument of social transformation, even at the level of one – or hopefully many – participant’s understanding on the topic of critical thinking in pharmacy education.

Ethical considerations

Given the close relationships established with ‘others’ during the ethnographic research process, ethnographers have a distinctive obligation to the people they are working with. According to the Institutional Review Board (IRB) of the University of Minnesota, the researcher must gain informed consent from anyone who participates in the research. The IRB approved this study and all participants provided me with oral and written consent. All classrooms where the research was conducted also authorized the carrying out of the study (see consent forms in the Appendix III). I made sure that the participants fully understood the purposes of the research, the implications of their participation, and that they would not feel coerced to do so. The invited participants were all above the age of consent. I guaranteed that they were neither harmed nor exploited by their participation.

In addition, I assured the confidentiality would be maintained and the participants’ identity would not be disclosed. It was challenging to keep the confidentiality in the

presentation of the results, given that this research was conducted in specific classes at the University of Minnesota College of Pharmacy and professors and curriculum stakeholders could be easily identified. In order to protect the confidentiality and anonymity of participants, I did not provide specific information neither about classes mentioned nor about the participants when they were quoted in this report. I referred to professors, teaching assistants and lecturers equally as “faculty” and I did not provide any specifics about the classes or sections taught by them. When I quoted more than one faculty in the same section, I referred to them as faculty A, faculty B, and so on. I adopted the same strategy when referring to students and curriculum stakeholders and, whenever possible, I provided more information about the participant or the situation presented by them.

Results and Discussion

Foreword

Critical thinking is a difficult subject to be handled because of its nuances and subjective connotation. I struggled with organizing and presenting the results in a meaningful way that would secure loyalty to its nature – rich and diverse – and flexibility to draw connections to the growing body of knowledge in this field. The results presented in this section are the fruit of several months of work searching for the most appropriate manner to ‘re-present’ the voices of the participants and preserve their singularity, while still reinforcing the applicability of the findings and their connections with the literature in the educational field.

The focus of this study was the classroom and how people interact in that environment as they learn the skills and abilities needed to take care of patients. I strived to keep it at the center of my discussion, but I built no walls in the process of constructing these results. I followed the path of the participants in an attempt to remain loyal to the knowledge and experiences they’ve shared with me. Therefore, although I mentioned in this study some activities conducted outside the classroom, I focused the discussion on how those activities impacted the outcomes perceived inside the classroom.

As I already explained in the “Ethical Considerations” section, the protection of the confidentiality and anonymity of the information provided by the participants was a significant point of concern for me during the entire research process. Besides using the general term “faculty” to refer to professors, lecturers, and teaching assistants, I also

avoid identifying the professional year in which students were registered at the College of Pharmacy. I did not have the intention to compare and contrast how critical thinking evolved, in the students' perspective, throughout the years in pharmacy school. Therefore, I found that the provision of this information would be of low relevance. Moreover, I only provided identification regarding campus location of the participants when that information was essential to the understanding of the argument made or when the perspective presented varied significantly between the participants from the two campuses.

Situating the Journey and the Findings

During the Spring semester of 2012, I spent most of my days in pharmacy classrooms, learning with and from students and professors. I would sit in classes on a daily basis. I would watch what they did and how they interacted in that space, and I would engage in informal conversations with them about how they teach and learn critical thinking skills.

My project was approved by all course directors and they allowed me to introduce my research, at the beginning of the semester, in each course I observed. Those five minutes were important to inform the participants about my constant presence in the classroom and to start a conversation with some students that found my research topic intriguing.

I conducted two focus groups with students from the Twin Cities campus, the first one with seven students and the second one with 11 students from years. I also carried

out one focus group in Duluth campus with six students. In every focus group I had the presence of PD1, PD2 and PD3 students. Each focus group lasted one hour.

In addition to the focus groups, I also conducted 13 interviews with faculty members, 10 interviews with curriculum stakeholders and 10 interviews with students, five of which were written interviews. On average, each face-to-face interview lasted one hour. One faculty member and one curriculum stakeholder were interviewed twice because the time booked for the first interview – one hour – was not enough to cover all the interview points. Three peer analyst collaborators contributed to the understanding of the results as they were presented in this report. The first peer analyst was a student who participated in a face-to-face interview and volunteered to collaborate with me in the analysis process. The second one was another student who also volunteered after participating in a focus group and the third peer analyst was a curriculum stakeholder that accepted my invitation to participate in the analysis process.

I identified 49 single definitions of critical thinking throughout this study. Even though they could be aggregated based on the skills and abilities referred, I felt that by doing so I would lose a precious aspect of the data collected: its richness and complexity. Therefore, the myriad of critical thinking definitions identified in this study were incorporated throughout the following sections, in an attempt to capture the concept in its fullness and diversity. I highlighted the skills and dispositions identified and I brought them to discussion, emphasizing the similarities and differences when compared to the current body of scientific literature available in the field.

The core findings of this study were organized in three main sections. I named the first section “Critical Thinking: Pharmaceutical Knowledge plus One Step Further”. In this section, I discussed the diversity of critical thinking definitions encountered and I highlighted their similarities and differences with the body of knowledge available on critical thinking. I discussed the skills and abilities associated to critical thinking in pharmacy according to the participants of this study and I also offered a detailed description of factors that might foster or deepen critical thinking abilities in the classroom, such as background knowledge and experience. I closed the first section discussing the particularities of thinking critically in pharmacy when students are learning to take care of patients.

The second section was named “The Dynamics of Teaching and Learning Critical Thinking”. I dedicated this second section to the introduction of the main characters in the classroom – students and professors – and to the discussion of the circumstances in which pedagogical practices fostered or hindered critical thinking in that environment. By doing so, I avoided the dichotomist approach to classify the teaching strategies as “good or bad”. I identified and discussed the rooms for improvement in the teaching strategies mentioned and I remained focused on my purpose to preserve the context, complexity, and diversity of the perspectives that were presented to me during my fieldwork.

Finally, in the third section “Thinking Critically About What Matters in Pharmacy Education: The Forbidden Topics” I focused on the politics and power struggles that permeated the day-to-day life in the classrooms and that had an impact on how the participants perceived, thought, and spoke about critical thinking. Power struggles, race,

and the conflict between teaching and research in higher education were themes discussed in that section.

Critical Thinking: “Pharmaceutical Knowledge plus One Step Further”

The variety of perspectives and definitions of critical thinking offered by the participants in this study encompasses its first major finding: defining critical thinking is a daunting task. Willingham (2007) offered some insights about why it is so difficult to teach it, but it also seems that critical thinking is an educational outcome very difficult to be conceptualized. Students, faculty and curriculum stakeholders articulated the concept of critical thinking in a variety of ways and depth that would be nearly impossible to present a summary of those definitions without incurring in loss of richness and comprehensiveness of the data collected.

Critical thinking ranged from “the ability to think about things that you don’t have in front of you” to deeper and more elaborated definitions that included seeing the various sides of an issue, attention to details without losing sight of the big picture, openness to new ideas, ability to apply knowledge in novel ways, and so forth.

When asked to share their own perspective of critical thinking in pharmacy, several participants acknowledged that they could not think of a definition of critical thinking because they have never thought of it or were never asked about it before. Others claimed to know the concept but fell short in finding words to define it, as one faculty member affirmed: “It’s one of those things that you know when it’s happening, but... (pause). Can you define that?”

A curriculum stakeholder acknowledged the confusion in using the term:

There are a lot of really global terms that we just kind of toss out there, but we don't really have concrete definitions for... That we know in our minds what we're looking for, and so we label them with these vague terms like critical thinking and problem solving [laughter]. – *Curriculum stakeholder*.

Some participants expressed their concern about the use of 'empty terms' in the educational field:

The truth is... I think critical thinking is one of those phrases that on some level maybe has lost its meaning, because it's so overused and so many things are attributed to it. I would relate it to another phrase that I dislike, which is active learning, which I also think has sort of lost its meaning. It's just so overused! Now, you know, people sort of sprinkle it in to whatever they talk about to maybe demonstrate that they're doing something innovative or whatever. So I don't know if that has any meaning either. – *Curriculum stakeholder*.

A consequence of the overuse and misuse of terms like critical thinking is that the concept is neither clearly understood nor systematically applied (Daly, 1998; Scheffer & Rubinfeld, 2000). In the educational arena, this might lead to poor outcomes in the processes that aim to teach those skills to future professionals.

For those who articulated a more concrete definition of critical thinking, the skills and dispositions mentioned in their definitions varied considerably among the participants. However, when the results were considered as a whole, the general idea embedded in those definitions remained the same: when it comes to pharmacy practice, critical thinking involves taking a "step further", meaning putting the patient's needs and

health first. This entails creativity, analysis, and sensitivity in the interaction with the patient. Critical thinking in pharmacy thus seems to require that the pharmacist reasons in a manner which utilizes appropriate “generic pharmacy knowledge” contextually adjusted to match the patient’s unique situation and needs.

The skills and abilities attributed to a strong critical thinker by the participants in this study are similar to those listed by Facione (1990). Interpretation, analysis, evaluation, inference, explanation, and self-regulation were embedded in the participants’ definition of critical thinking in pharmacy.

Interpretation, defined by Facione (1990) as the ability “to comprehend and express the meaning or significance of a wide variety of experiences, situations, data events, judgments, conventions, beliefs, rules, procedures, or criteria” (p. 6) was described by the participants in this study as the ability to focus, at the same time, on “the big picture and the details”:

I mean, you just have to look at each piece and see if it fits well. And then also, you have to question: “is it a good piece?” Those are two separate items. I think that’s part of critical thinking. And then when you see the whole picture, then you also have to be able to disintegrate it and break it down into the parts again, understand the parts, and see how it was put together. So, it’s both putting things together but also taking things apart, I think. – *Faculty*.

The importance of context is explicit in the quote above and it was a common theme among those participants who talked about piecing together a wide variety of information, resources, and experiences in the process of taking care of patients. It

informed my reflections throughout this research, as I grappled to make sense of the results.

I am still thinking about metaphor used by [Faculty] in our interview earlier today: “Critical thinking is the ability to see the tree without losing the focus on the forest”. It is well connected to the idea of paying attention to the details, while still being focused on the big picture. It is also connected to the idea of being able to treat a kidney dysfunction or a heart failure without losing sight of the patient. From what I have heard so far, it seems that the participants are talking about the ability to identify and interpret all the factors that are involved in a certain situation. This identification and interpretation, though, seems to be essentially context-bounded. – *Reflective journal, October 2011.*

“Analytical” was another term commonly mentioned by students as an essential characteristic of a strong critical thinker. By analytical, students meant: “being able to analyze multiple and sometimes conflicting variables and information, and coming to a supportable conclusion which may or may not deviate from common practice guidelines.” – *Student, focus group.*

The evaluation component of critical thinking was explained by the participants as “the ability to weigh the pros and cons of an issue”, its contextual relevance, and to be able to raise pertinent questions that might lead one in her decision to accept or refute an argument.

It [critical thinking] also involves questioning the validity of things or questioning why something is done a certain way. For example, critical thinking can be applied when reading a newspaper article to question the author’s authority, if they have any bias, what if any fallacies are present, etc. – *Student, focus group.*

The ability to draw conclusions based on a variety of information and to do it in a fashion that includes the patient's perspective was one of the most prevalent skills associated with critical thinking. During the focus group, the students were given three minutes to reflect and write an answer to the question: "What does critical thinking in pharmacy mean to you?" After that time, they were encouraged to share their thoughts. A student volunteered to start the discussion in one of the focus groups and her definition of critical thinking was rooted in the identification of elements needed to draw reasonable conclusions:

I think that critical thinking in pharmacy means looking at problems holistically, taking multiple perspectives and weighing what the risks and benefits are before you make a decision about someone's health. I think it means understanding that the choices you make are not always going to be a hundred percent right, but you always need to try to do the best for your patients. It means being able to compromise and knowing how to pick your battles. It means incorporating information from many different sources and using this information to make informed decisions. – *Student, focus group.*

Explanation was described by Facione (1990) as the ability "to state the results of one's reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments". In this study, explanation was highly linked, in the participants words, to the ability of effectively and appropriately conveying the knowledge or the reached conclusions to a specific audience.

If you don't understand what the person needs are and you can't communicate with the person, it doesn't really matter what you know because you are going to be ineffective. – *Faculty*.

I think a big part of critical thinking is being able to convey your knowledge, your expertise, your specialty, to everybody else. We probably know pharmacology and pharmacokinetics and those types of things a lot better than other healthcare professionals but, again, dealing with patients, with other providers, we have to put it in terms that they can understand and that they can apply to their own thinking because otherwise, our knowledge isn't beneficial to them. – *Student, focus group*.

Even though self-examination of one's cognitive activities was not clearly addressed by the participants, they expressed the willingness to use all the available resources and strategies, to reconsider decisions, and to correct possible mistakes or misinterpretations, especially when it comes to patient care:

So I think critical thinking to me means using all of your available resources and knowledge and experiences in coming up with the best answer that you can and then being willing to follow up on that and maybe modify that once you learn the outcome. – *Student, interview*.

The similarities of these findings with the current body of literature that supports the definition of critical thinking are obvious. However, there were some few significant differences. The first and most eminent one was the fact that critical thinking and problem-solving were terms used almost interchangeably by the participants.

Critical thinking is having the – knowing where to look, having the very foundational knowledge to be able to access the information you need to solve a problem, to me. It's not necessarily having it inherent in you. It's a

process of thinking of problem solving. – *Student A, face-to face interview.*

To me, critical thinking implies problem-solving at a higher level involving application of learned concepts, and not simply reproduction of memorized material. – *Student B, face-to-face interview.*

According to the AACP Commission to Implement Change in Pharmaceutical Education's rationale, critical thinking skills are expected to help pharmacists to solve problems more efficiently and to make sound judgments in the light of their professional knowledge (AACP, 1991). The debate regarding the relationship between critical thinking and problem solving is not new and several authors have articulated it in different ways (Heywood, 2000; Willingham, 2007). However, Oderda et al. (2010) have already expressed what appears to be the most applicable perspective of this debate to the goals in pharmacy education:

While it is important to consider that critical thinking and problem solving are linked, situations arise where one skill might exist separately from the other. Individuals may engage in critical thinking, but not use the resulting thought to solve a problem. Thus, consideration of these terms separately is warranted in order to proceed with instructional design and assessment. (Oderda et al., 2010)

When striving to elaborate a definition of critical thinking in pharmacy, the participants were keen in describing the personal traits, habits of mind, and attitudes that characterize strong critical thinkers. During the focus groups, students were asked to jot down the 'top three characteristics' of a pharmacist who thinks critically. The cloud tag resulting from the analysis of this written material is presented in the Figure 3. The font

sizes of the words included in the cloud tag are directly related to the frequency of those words in the students' narratives.



Figure 3: Characteristics of a strong critical thinker, according to the students.

While most of these characteristics are similar to those presented by Facione (1990), it is apparent that students also referred to creativity as an essential trait of critical thinking in pharmacy. This finding was corroborated by opinions expressed during the interviews with faculty, curriculum stakeholders, and students.

I define critical thinking as using learned facts in such a way that a novel concept is developed that surpasses the information contained in the facts. Critical thinking is utilizing pieces of information, either individually or in tandem, to come up with something new. – Student, interview.

You have to sort of combine logic and creativity in caring for patients a lot of times. Logic to figure out what the problem is and then creativity to solve it. – *Student, focus group.*

It is an interesting question because you know what you think, but to articulate that... (long pause). So for me, critical thinking is when a student is gaining knowledge in a specific area, discipline or gaining knowledge in a certain type of skill. So they are gaining that knowledge and critical thinking is to be able to take that knowledge and apply it, but apply it in a way that requires the student to take it to another level of understanding. So they are not just simply passive recipients of knowledge that can be regurgitated back. They actually are required to reformulate that knowledge they have gained to be able to answer a higher order question that goes beyond the details of the specifics that they have just been taught. – *Faculty.*

It is worth noting that Scheffer & Rubinfeld (2000) also found creativity to be one of the habits of mind of critical thinking while conducting a Delphi study in an attempt to formulate a consensus statement on critical thinking in nursing. This particular finding might have many implications for pharmacists in practice, education and research. Creativity sounds to be, therefore, a trait that cannot be left behind when designing learning strategies and assessing students' critical thinking outcomes.

The ability to retrieve information was one of the skills most strongly related to critical thinking in pharmacy. The findings suggest that this type of knowledge might be

one of the most important teaching legacies that higher education could provide to healthcare students nowadays. Given the vast amount of information available and the short time at school to learn everything, the ability to efficiently sift through it and find suitable answers seems paramount. Given the depth, breadth, and novelty of the insights offered by the participants on this topic, it will be discussed in more details in a sub-category below.

The ability to retrieve information

Both faculty and students were aware of the fact that it seems impossible to teach and learn everything at school, given the fast pace of changes we are facing nowadays in the healthcare field and the short time, during the professional education, to cover all the information. So, in this sense, critical thinking reflects mainly the ability to retrieve the needed information that would be necessary to provide optimum patient care.

You can't know everything. You can never, never, ever know everything and we can't teach our students everything they need to know, because the moment they leave these walls, the world will have changed and there will be a new therapy option, we'll learn something, there will be a new condition. It's not static. – *Faculty*.

And what we tell the students is we're not going to teach them everything. You're going to learn the skills that you need, you're going to be able to figure out on your own whether it's the drug information skills or whatever you need. I'm not going to teach you every drug in the book. Not going to happen. Too short of a time in pharmacy school. – *Curriculum stakeholder*.

The generic calls found in the literature to teach students to make better judgments and reason more logically are deeply rooted in the fact that practitioners frequently must make complex decisions affecting patient care. Those decisions are inevitably influenced by the vast amount of information available in the healthcare field and it is frequently incomplete and imperfect (Austin, Gregory, & Chiu, 2008). Therefore, practitioners must be able to connect and extrapolate pieces of information and make reasoned judgments based upon the best available evidence (Facione & Facione, 2008). In clinical practice, it might go from good interviewing skills to learning how to analyze a paper and decide whether the gathered information is accurate/reliable or no.

The information is already at your fingertips. So [critical thinking] is a way of thinking when you're looking things up and thinking about "What should I be looking for here? What does look right here? What doesn't look right here?" Being critical and just trying to assess, make a professional judgment about whatever drug or content is being discussed.
– *Faculty.*

Faculty and students emphasized that the access to information is not the limiting factor to a successful intervention in healthcare anymore. As long as the professional has access to technology, the information is at his/ her fingertips. The key, according to the participants, is to know what questions to ask and where to look for the answers.

And in my opinion, that's what [critical thinking] essentially is – we live in an age, today, where you can look up any information. Resources are basically unlimited. You can find anything you need to know about a drug, about anything, if you just know where to look and have the skills to be

able to access it and a framework to put it into. – *Student, face-to-face interview.*

Curiosity was also mentioned as the engine that propels people to dig deeper, think harder. As put by a faculty member, in order to be a strong critical thinker “you have to think of yourself as sort of a detective. Like, you have to be curious, and you have to dig in to get at that and ask, “What am I missing?” This dispositional component identified seems to be intimately related to the “inquisitiveness with regard to a wide range of issues” and the “concern to become and remain generally well-informed”, which are two of the affective dispositions of critical thinking listed in the consensus expert published by the American Philosophical Association (Facione, 1990).

Some faculty members went as far as affirming that it is not possible to be a strong critical thinker without having curiosity. Whether it is possible to teach it or not, they were not so sure. But there was a common belief, among those who mentioned curiosity as a dispositional component of critical thinking, that it is possible to create spaces in the classroom for students to be curious about.

For example, when we say: “This is the article and here are the questions that you have to answer”, the students will go ahead and probably answer these questions. But how many other questions should they be asking themselves when they are reading the article? – *Curriculum stakeholder.*

Participants were very metaphorical when describing the actions needed to retrieve the information required to think critically. According to them, one has to “dig deeper”, “delve below literal meanings”, “get to the root of the problems”, “go underneath the surface”, “get dirty with it” in order to achieve that higher order of thinking. From all the metaphors used to describe the act of think critically, none was

more prevalent than “thinking outside the box”. Some students who participated in one of the focus groups explained this metaphor:

STUDENT 1: It’s kind of cliché but we’re taught, like STUDENT 4 was saying, all the guidelines. We’re taught all these little boxes that people fit into and the cliché is “thinking outside the box”. You need to get outside of... You need to think beyond the box and maybe make the connections to other boxes, other paths, other choices outside the guidelines.

MODERATOR: So what would the box be? [Referring the question to the entire group]

STUDENT 2: A piece of information.

STUDENT 3: A range of numbers.

STUDENT 4: DiPiro [pharmacotherapy textbook].

STUDENT 1: A sodium value. You have to think: “okay, this is what the sodium value is. The guideline says I need it here. But maybe this patient has been functioning just fine with it a hair below the guidelines”. So you have to think and analyze. Do I look at his number and say “oh my gosh, it’s low! I must treat it”? Or do I look at his number and say “yeah, it’s outside the reference range, but it’s normal for him, it’s not harming him”. I mean, there are more important things to take care of and evaluate beyond just that set of numbers. – *Focus group*.

According to the participants, there will always be the usual and customary things that seem obvious in every situation. “Thinking outside the box”, then, refers to the constant search for other paths, other alternatives, and novel ways to think or to solve a problem. This student gave a vivid example of what it would entail in pharmacy practice:

So you come to me and tell me today: “I’ve been having diarrhea.” I could quickly jump out as a pharmacist and give you something that can help you with the diarrhea, which is just, basically, you’ve told me a sign, a symptom, and I’m helping you with something that solves it. But critical

thinking is sort of going beyond that, trying to get to the underlying cause or measure, trying to think and ask you what exactly is causing your diarrhea. Is it food? Are you lactose intolerant? Is something else happening to you? When did it start? How long has it been? What else have you taken? Going beyond that, you know, not just the superficial ‘you give me a question and I’m giving you the answer and here you go’.

– *Student, face-to-face interview.*

This faculty member also commented on the importance of thinking outside the box:

When I think of pharmaceutical care, it’s not just like what’s on the paper [referring to cases used in class]. Sometimes there are aspects that are missing and unless you actually dig in deep, you won’t figure out what the problem is. It may look perfect and the doses may be very appropriate, but unless you’re actually branching out and thinking outside the box, you may miss a lot of things. – Faculty.

While striving to place the various aspects of critical thinking concept used in pharmacy within the larger body of literature currently available on this subject, I identified two themes that were highly associated with critical thinking in pharmacy, even though not directly related to its core definition. The first one refers to the factors that might foster or deepen critical thinking abilities in the classroom and the second one is related to the particularities of thinking critically in pharmacy when students are learning to take care of patients. I named them “the catalytic factors” and “the algorithm of thinking”, respectively, and I offer a more detailed description of these themes in the subsequent sections.

Catalytic factors

Faculty, curriculum stakeholders and students were in agreement that both background knowledge and hands-on experience would foster critical thinking abilities in the classroom. Previous knowledge provides the starting point, the “seed” that leads to further investigation. This previous knowledge seems to be what leads and directs one in her search for new information: where to dig? How far to go? Critical thinking is, by a certain extent, an expansion of those horizons of knowledge into a more suitable answer to the question being considered.

Similarly, experience was seen as one of the most effective ways to learn to think critically. In fact, some participants mentioned it as the only way to actually learn critical thinking skills. The general idea is that experience makes the learned information to “stick better”, so one can build on that ‘internalized concept’ when facing a novel situation. This student summarized very well how those ‘catalytic factors’ work together, allowing one to apply critical thinking skills:

Well you’ve got to know something in order to make decisions. You have to know drug classes, and indications, and contraindications. You have to know certain facts; a lot of facts. And then also you need to know, I guess, based on our education we hopefully are trained a little bit on how to look up information if we don’t know it. If we need to find a fact and we don’t know the answer, we can look it up. But then, after we learn how to do those things and we have all these facts, and all these guidelines, and all these rules in our mind, then we can apply it to a real life situation. The more that you do apply that, the more experience you have and the easier it becomes and probably the better answers and solutions you’re going to come up with, I would think. – *Student, focus group.*

Background knowledge

This was one of the rare topics discussed by all the groups of participants in the present research. Students, professors, and curriculum stakeholders were unisonous in claiming that one is not able to think critically regarding a certain subject matter without having the basis of the knowledge to do so. In this context, critical thinking was again highly associated with problem solving skills, as evidenced in this quote from a faculty member:

So you had this baseline knowledge, you use everything that you know, apply it to a new situation; that's critical thinking to me. That's critical thinking, that's problem solving, and that's really being able to adapt in the real world. – Faculty.

Although critical thinking is regarded by experts as a set of skills that can be used at any time, in any context, they do recognize that thought processes are intertwined with what is being thought about (Facione, 1990; Seldomridge & Walsh, 2006; Willingham, 2007). Facione (1990) corroborated the fact that increasing one's base of information could be a way to improve one's own critical thinking. He states that

While critical thinking skills themselves transcend specific subjects or disciplines, exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts. (Facione, 1990)

As mentioned by Seldomridge and Walsh (2006), knowledge is a valuable tool that helps us make connections between concepts and draw more informed conclusions based on the confrontation of different sources of information. Willingham (2007) also affirmed that critical thinking is very much dependent on knowledge and practice and that “it

makes no sense to try to teach critical thinking devoid of factual content.” However, those experts reminded us that the interdependence among these two factors should not be mistakenly understood as linear and unidirectional. This misunderstanding, however, was prevalent among the participants in this research, as expressed by this curriculum stakeholder:

Well, I mean I think we have to present a base level of knowledge first because they [students] have to know the language to be able to converse in it. So I think we have to present them that and there’s time involved in actually trying to learn that. And then, at that point, once they get a little bit of base knowledge, then it’s good to start doing the act of learning. I don’t know how you could really... I mean, sure, you could do active learning in the beginning, but I don’t know what you’re going to get with it without them [students] having a base level of knowledge. – *Curriculum stakeholder.*

It seems evident from the literature available on this field that knowledge is supposed to foster critical thinking skills and the participants in this study clearly and repeatedly stressed this point. However, their understanding that the relationship between knowledge and higher order of thinking skills has a linear and unidirectional character would certainly be regarded as misguided and inappropriate by experts in critical thinking (Facione, 1990; Seldomridge & Walsh, 2006).

I became curious to understand why this (mis)understanding was so prevalent among the participants. I delved in the literature on critical thinking and higher order thinking skills and I realized that this notion of linear and unidirectional relationship between background knowledge and critical thinking aligned nicely with Bloom’s taxonomy of educational outcomes. Benjamin Bloom (1956) described six categories –

knowledge, comprehension, application, analysis, synthesis, and evaluation – in which the commonly expected learning objectives are likely to fall in. He presented the taxonomy as a pyramid, suggesting that one cannot effectively begin to address higher levels of thinking until those below them have been thoroughly addressed. In Bloom's writings, the lowest level of learning in the cognitive domain is referred to as knowledge. Moving up, the next level of thinking is comprehension, followed by application; analysis; then synthesis; and finally evaluation, which Bloom suggested to be the highest order of critical thinking behaviors.

It is my understanding that the cognitive domains of Bloom's taxonomy contain a wealth of information on critical thinking instruction. However, I agree with Paul (1990) when he argues that Bloom's taxonomy was not designed to further critical thinking as such. It was designed to describe and classify learning objectives within education. Therefore, the recognition of its usefulness to critical thinking instruction is as important as the acknowledgement of its limitations in this process (Paul, 1990).

When discussing the connection between Bloom's taxonomy and critical thinking instruction, Paul (1990) was particularly critical of the hierarchical and unidirectional character of the categories of educational objectives in the cognitive domain. In his analysis, he stated that comprehension presupposes knowledge, but knowledge does not presuppose comprehension in Bloom's taxonomy. This is considered a strong point of disagreement between these two theoretical concepts – critical thinking and Bloom's taxonomy –, since critical reflection is regarded as an essential precondition of

knowledge, according to many experts in critical thinking (Paul, 1990; Facione, 1990; Halpern, 1999; Austin, Gregory, & Chiu, 2008).

Regardless of the relative value of knowledge for the mastery of critical thinking skills, the questions of what should be called “knowledge” and by which means it should be taught and learned ought not to be left alone, as they are the core of any educational process. Another participant made the clear connection between the knowledge basis allegedly needed to apply critical thinking and the justification of memorization as a required skill in the learning process:

You cannot apply critical thinking skills if you don't know anything. Sometimes I hear people sort of make this statement that memorization is never important or that core content doesn't need to be memorized... And I strongly, strongly oppose that viewpoint because you have to know something to be able to apply it. – *Curriculum stakeholder*.

Memorization was a common theme extensively discussed by students and faculty, some of them stressing its importance – as in the quote above – and some of them pointing out its detrimental effects in the process of ‘achieving knowledge’. Paul (1990) contributes to this discussion when he asserts that

Knowledge is not something that can be given by one person to another. It cannot simply be memorized out of a book or taken whole cloth from the mind of another. Knowledge, rightly understood, is a distinctive construction by the learner, something that issues out of a rational use of mental processes. (p. 523)

In this sense, the direct correlation between memorization and knowledge might be profoundly detrimental to the development of critical thinking skills. Caution is warranted when such conception is still part of the repertoire of teaching and learning

strategies used by faculty, students and curriculum stakeholders, especially when they are invested in a curriculum that expects critical thinking to be one of its main educational outcomes.

Experience

Taking a critical thinking approach to clinical practice seems to entail two essential, linked goals: accurate problem identification and optimal problem resolution. Experts agree that experience may actually sharpen the ability to solve problems by assessing evidence using valid inferences, abstractions, and generalizations (Scott, Markert, & Dunn, 1998). This faculty member explained the importance of experience to a sound clinical judgment:

For me critical thinking is all about the information that you gather as a clinician, and that's many times gathered through an interview. So you should be able to process that information, and that processing usually is dependent upon a clinical experience, or what you have seen before. So critical thinking is taking that process, what you've seen before, and then being able to analyze it, look at all the possibilities that you know of... Maybe the common possibilities of why something is indicated or not indicated... You can't just say well it's indicated or it's not indicated, because if it's indicated, you have to critically think about why is it indicated? So what is there? Is it a laboratory value; is it a physical assessment like blood pressure, like urine flow? Whatever that is, you have to be able to look at that, interpret, and ask: "okay, their urine flow is not normal but it's not really low, so is that a problem?" You have to make a clinical judgment and a clinical judgment is a critical thought process.

Again, you have to have experience to know why and when to intervene. –
Faculty.

The idea of applying a known method, principle, or theory to a novel situation connected to patient care supported the argument that experience furthers critical thinking. By ‘applying’ it, students not only put in practice an abstraction learned, but they also accumulate experience that will be a valuable tool to interpret and evaluate a future novel situation. This professor discussed the importance of ‘application’ to the maturation of critical thinking skills:

I think it’s applying it. I think that’s why we went the case study route and said "okay, apply it". I mean, you can learn all the bench science you want. You can learn all the pharmacokinetics you want. You can learn all the toxicology you want. If you don’t bring it all together in this case and apply it, I don’t call it critical thinking, because the thinking then is in your own mind, along one little chain of events. – *Faculty.*

According to the participants, hands-on experience or “application” gives one a ‘whole picture’ of the situation and it should therefore be considered a cognitive critical thinking skill. By whole picture they meant not only knowing the original factors and their implications, but also acknowledging and including the consequences or results of that given thinking path. This knowledge might be very useful in another similar situation, even though it does not guarantee the same results, given the specificity of each situation.

In Bloom's taxonomy, "application" is one of the educational objectives listed and it is defined as "the ability to use an abstraction correctly given an appropriate situation in which no mode of solution is specified (Bloom, 1956). Similarly, the problem-solving approach includes the definition of the problem, identification of strategies to solve the problem, proposition of solutions or strategies, evaluation of potential solutions, implementation, and outcomes evaluation (Oderda et al., 2010). The ability to apply the knowledge in a concrete, patient-related situation seems to be in alignment with the step of implementing a strategy to answer an open-ended question or achieve a desired goal in problem-solving strategy.

Application is not listed as a critical thinking cognitive skill in the consensus published by the American Philosophical Association (Facione, 1990). However, this same institution suggested that the demand for knowledge application should lead to the appreciation of robust critical thinking and domain-specific knowledge in education (Facione, 1990).

Even though these findings suggest blurred boundaries between the terms used to name critical thinking skills, Bloom's educational objectives, and problem solving steps, I argue that there is still value in discussing the importance of application for the desired outcomes in practice. The paradox, in this case, relies on finding a consistent theoretical support to the pedagogical interventions that are likely to produce the desired educational outcomes.

From my perspective, it seems that the educational objectives in any healthcare profession are moving towards the preparation of a more active and accountable professional. The responsible and ethical application of learned principles and the management of its consequences are an unquestionable, desirable learning objective in pharmacy. The very definition of pharmaceutical care proposed by Cipolle, Strand, and Morley (2004) encompasses both application of pharmacy knowledge to meet the patient's drug related needs and accountability for the results of this commitment.

Most of what we teach and learn is intended for application to solve complex problems in real life and it is a strong indicative of the importance of application objectives in the general curriculum. It would not be difficult to conclude, then, that the effectiveness of a large part of the educational effort is dependent upon how well the students retain and apply the learned concepts to situations or problems never faced in their learning process (Bloom, 1956). As explained by a curriculum stakeholder, students learn from each patient – simulated or real – and they are encouraged to incorporate those learned lessons into a new situation, with new patients. She goes on, explaining that

[experience with a patient] It's a building block. You're scaffolding all the way through. And you never stop learning how to think critically. Even when you're practicing, you don't stop, because there's always a different patient that comes in with something new. – *Curriculum stakeholder.*

That's how critical thinking matures with practice and experience. The experiential component of curriculum delivery, according to the participants of this study, was designed to build skills and strengthen what students have learned in the classroom. Lisko and O'dell (2010) corroborated this view, reinforcing that learning should be seen

as a continuous process. According to them, knowledge is created by transforming experience into existing cognitive frameworks, which might lead to changes in the way a person thinks and behaves as he progresses and matures in his professional career. But what of so important does experience bring to the process of thinking critically?

(...) Real patients, real scenarios. I mean, previously in class it was always like a grading rubric. I had to get the right answer based on what the grading rubric was. But in the real world there sometimes isn't a right answer. And so, having that really made me a critical thinker. – *Student, face-to-face interview.*

Students who had the chance to work with simulated patients in lab or that had contact with real patients during their Introductory Pharmacy Practice Experience (IPPE) – like the one quoted above – cherished the experience and highlighted its importance for the development of critical thinking skills. Participants of this study were in agreement that, when it comes to making clinical decisions from a critical thinking standpoint, “one size does not fit all”. The same clinical situation might accommodate a multitude of suitable answers and the key factor in deciding what to do comes down to what would be the best fit for that specific patient. In fact, when describing how critical thinking relates to clinical judgment, Facione & Facione (2008) stated that “critical thinking is the process we use to make a judgment about what to believe and what to do about the symptoms our patient is presenting for diagnosis and treatment”.

Patient centeredness emerged in this study as an essential component of thinking critically in pharmacy, as suggested by these participants:

It needs to be in terms of the patient understands and that they're going to be able to do... If you send a patient home with a medication they have to

take four times a day and they've got three kids and a job and soccer and like all this other stuff. I mean, I always thought it was silly that patients didn't just take their medications like they're supposed to. I got put on a 10-day course of Amoxicillin twice a day and I missed three in those ten days, and I didn't have anything super crazy going on, so... – *Student, focus group.*

We are moving now to a much more patient focused approach. Drugs, chemicals tend to behave the same all the time. Patients are much more complex than that [laughter]! You know, you put them in the same situation and they may respond differently than they did the last time, because what they just did changed the way that they would think about responding to it. – *Faculty.*

In this sense, the most important contribution of the experiential component of education is its ability to expose the students to the “grayness and complexity of patient care”. Participants emphasized that, in the real world, there are no straight answers. There is no straight right or wrong. There is the best for that specific patient, in a specific condition. The ability to incorporate the patient factor in all its grayness in the plan for action revealed to be an important trait of critical thinking in pharmacy education. Being ‘patient-centered’ represents a step towards better outcomes in this thinking process.

The participants agreed that there is a ‘basic package of knowledge’ that each individual needs to have in order to think critically, but they also recognize the importance of expanding this base with experience and the specific knowledge that emerges from it. It is also important to highlight that the catalytic factors might contribute

to the improvement of teaching methods used in classroom: pre-work assignments, background readings, recorded lectures, slides posted online: these are some examples of strategies mentioned by the participants of this study as valuable tools to gain background knowledge. They might enable students to develop and apply critical thinking skills in the classroom in a more proficient way.

Additionally, the experiential component of pharmacy education seems to be very important to the development of critical thinking skills and dispositions. According to the participants, it is highly important to situate problems in the patient's context and link it more clearly – and more often – with the didactic approach for best learning. These specific points regarding the use of catalytic factors to improve the learning experience in classroom were further explored in the section “The Dynamics of Teaching and Learning Critical Thinking”.

The algorithm of thinking

‘Algorithm’ was one of the words frequently used by some participants to explain the thought processes that have been taught in pharmacy classrooms. According to the participants, there is an algorithm to “think like a pharmacist” and it consists in essential steps that the students – and professionals – have to go through during the care process:

One of the things that I know that makes pharmacy and pharmacists different than a technician is the scientific aspect of it. And it's not just the science, like understanding chemical, the physiology and things like that, but it's the ability to think through an issue, and really consider all of the other avenues. And I think that sometimes in healthcare - and I've seen

this in pharmacy too - they come up with algorithms. So there's these step, step, step that you just go through in your mind and that's how you do it.

– *Curriculum stakeholder.*

Closely associated to the idea of algorithm was the term “thought process”, meaning those same rational steps that a pharmacist should go through, when taking care of patients, to make clinical judgments without “missing something” that might be important to the quality of care provided. According to the participants, the mastery of this thought process equates to critical thinking in pharmacy when the focus is to take care of patients.

To me, critical thinking in pharmacy means that you are able to think your way through a problem by knowing the process. Being able to apply that process of thought to a variety of questions is what critical thinking is all about. Being able to think on the fly and not just having dosage regimens memorized for ideal cases is critical thinking in pharmacy. – *Student, focus group.*

I think we teach a process. I don't think we're consistent yet across faculty, much less across colleges, but I think we'll get there. (...) We're teaching that process, because if you know how to collect the information and then presumably know how to access, and you know what you don't know, then you should be able to identify drug therapy problems and prepare a plan. In that process, you're using your pharmacotherapy knowledge, you're using bio pharmacy, you're using pharmaceuticals, all of that stuff. If it's something safe and you're monitoring it correctly, it all sort of fits together. – *Faculty.*

When asked for a concrete example of the application of this “thought process”, a student offered the following explanation:

So the patient has a problem or the patient has something that he is coming to you for, for a service or an outcome that they want. Critical thinking is taking all the information that they [patients] present – that you have been educated and know how to take – and piecing together a care plan based on their values, on their objectives, the whole subjective objective information, all those things in a way that enables them [patients] to live to the best quality of life or length that they desire. Based on their own cultural, based on their own ideas of what they want in their life. To me, that's what critical thinking is: taking the resources that you have available to you and applying them in a way that... It's not always going to be a linear, x-y-z process. But trying to take the information that you have and use it in a way that is getting the outcome that you want or the patient wants. –*Student, face-to-face interview.*

His description of the application of the thought process is very much aligned with the definition of pharmacotherapy workup, as proposed by Cipolle, Strand, and Morley (2004):

This systematic thought process allows practitioners to use knowledge already learned and apply it to a new patient. It is the process that allows the practitioner to apply the knowledge learned from textbooks and research results to a specific patient in practice. (p. 8)

Cipolle, Strand, and Morley (2004) affirmed that what qualifies a pharmacist to assume clinical responsibilities towards the patient is the application of a unique knowledge base and set of clinical skills using a systematic thought process to assess the needs of a patient, identify and resolve drug therapy problems, and prevent those problems from occurring. Many participants talked about this thought process in generic

terms, meaning a rational, structured way to make clinical decisions. However, some participants clearly named it, as the following faculty member:

So it brings you down to a different thought process. Well, it's not really a different thought process, it's the pharmaceutical care thought process. So it's not a different thought process, but it's much more in-depth than looking at "oh, you have high blood pressure and so I'm going to put you on Losartan". I don't think that's critical thinking. They have high blood pressure, why? What's the reason for your high blood pressure? So you have to dig down deeper into it and then once you've dug down deeper into it then okay, we have these medications which are indicated for mild hypertension. Well, we have four to choose from. Why would you choose one of these over another? You have to be able to articulate, go down deeper and choose the therapy that will fit best with the patient and the patient's medication experience. – *Faculty*.

The pharmacotherapy workup was mentioned several times as the framework that needs to be in place before one uses the needed flexibility to explore alternatives while thinking critically. The pharmacotherapy workup, as proposed by Cipolle, Strand, and Morley (2004), is the cognitive work occurring in the mind of a pharmacist while caring for a patient. It takes place during the patient care process in pharmaceutical care, where the pharmacist assess the patient's drug related needs; identify any drug therapy problems that might be occurring; develop a care plan together with the patient; and determine the actual outcomes of the interventions proposed. In order to identify drug therapy problems, the pharmacist should always assess each medication used by the patient in terms of its indication, effectiveness, safety and convenience for that specific patient (Cipolle, Strand, & Morley, 2004).

The pharmacotherapy workup was not claimed to be a magic formula for critical thinking in pharmacy, but it was highly associated with the idea of applying critical thinking skills in pharmacy practice focused on patient care. According to the participants, critical thinking is not about finding the ‘right answer’. It implies a thinking process that enables one to go through a situation or problem and get a deeper and clearer understanding of what is going on in that specific condition.

“Because critical thinking gives us options and those four steps [indication, effectiveness, safety, and convenience] help guide the quality of the care we give. You wouldn’t want to use critical thinking and come up with novel solutions that are going to be harmful. You want to keep it still effective and safe. So the four guidelines let you be creative and come up with solutions and know whether or not you’ve hit the end of the gray zone; whether or not you’ve gone too far, like “I don’t dare give them 120 milligrams of an ACE inhibitor. We probably ought to switch to something else by now.” So it helps you identify where the boundaries are. “I can’t go any farther. It wouldn’t be safe any longer.” – *Student, focus group.*

Even though closely associate, critical thinking and the pharmacotherapy workup process were not used interchangeably by the participants. In fact, one faculty member was very emphatic in highlighting the difference between the two terms. He affirmed that the structure or the thought process involved in the pharmacotherapy workup does not equate to critical thinking, but it rather gives the students a reference point or a framework to approach a patient and it also establishes the ground rules that guide them in their clinical judgments:

And I think that to have a structure that way is important because... I don't think the structure is the critical thinking. The structure frees someone to think critically, rather than having to do the non-critical thinking, the rote thinking, because that has become habit, that's the structure. You can do all that in your sleep, and then when the things start coming in, all of a sudden, you know when things are a little bit off center.

– *Faculty.*

The University of Minnesota College of Pharmacy places great emphasis on preparing pharmacists for clinical practice. One of its goals listed in the 2011-2016 Strategic Plan is to “partner with the profession of pharmacy in making a patient-centered pharmacy practice the standard of care and a vital part of the health care delivery system.” (University of Minnesota [UMN], 2013). It would be expected, therefore, that the PharmD curriculum emphasize critical thinking as a way to achieve that goal. The association between critical thinking and clinical practice has been extensively discussed by several authors (Scott, Markert, & Dunn, 1998; Daly, 1998; Facione & Facione, 2008; Facione, 2013) and excellence in professional judgment is considered the result of the sound use of critical thinking skills. The connection, thus, between pharmaceutical care and critical thinking seems rather natural in this context, from my perspective.

The Dynamics of Teaching and Learning Critical Thinking

In this section I offered a thick description of the main subjects involved in the teaching and learning process in pharmacy classrooms. Moreover, I focused on the methods and strategies used in the classroom and I deepened the discussion about issues that influenced their effectiveness in teaching pharmacy students to think critically.

During the process of data collection I had the chance to get to know better the faculty members and students involved in the classes I was observing. Their identity, wishes, passions, fears, and expectations were generously presented and discussed with me. I was struck by their openness to talk about sensitive issues in the classroom. From my perspective, most of the participants held themselves accountable for their share in regards to the outcomes achieved – or not – in the classroom. At the same time, to answer those “hard questions” with sincerity was a cathartic moment for faculty, curriculum stakeholders, and students.

It is my understanding that, by knowing the actors, it becomes easier to understand their attitudes and motivations in the teaching-learning process, as well as the methods used and the climate encountered in the classrooms. In the following sub-sections I introduced the teachers, the learners, and I delved into the wealth of information provided by the participants regarding their successes and failures in teaching and learning critical thinking in the classroom. I discussed specific teaching strategies – such as lectures and case studies – as well as other resources used in the classroom. Then I focused my discussion on the disconnections found in the classroom that had an impact on the

process of teaching and learning critical thinking. The gaps between instruction and assessment strategies and didactic and experiential learning were some examples of topics brought up by the participants. I ended this section discussing some environmental issues – e.g. class size, space, and technology resources – that contributed to the non-linearity in the process of teaching and learning critical thinking in pharmacy classrooms.

Meet the Teachers

One of the promises found in the Oath of a Pharmacist reads: “I will use my knowledge, skills, experiences, and values to prepare the next generation of pharmacists” (Oath of a Pharmacist, AACP, 2013). Some professors took that promise seriously and expressed their enthusiasm and passion for preparing future peers that will help shape the future of the profession.

I love teaching and I have a commitment to these students becoming good patient care providers because they are going to be my colleagues, right? So if I am going to work with them and I am going to send them out and say, "Yes, I helped teach them." I want to be proud of that! I want them to be competent and confident and good at what they are doing. – *Faculty*.

However, far from being a “homogeneous sample”, the 13 faculty members interviewed offered a broad array of perspectives on how they feel in the classroom going through the perils and promises of such a challenging environment. Professors’ attitudes towards teaching varied from passion to a supposed neutrality.

The professorate in the United States is comprised of three distinctive and equally important roles: teaching, service and scholarship (Baia & Strang, 2012). Thus, it seems reasonable to think that professors would receive serious training and preparation for all

three roles in the same proportion. Although some professors expressed concern about this topic, many of them introduced me to another thought-provoking facet of pharmacy education: the fact that teaching has happened to them by chance, not as an intentional choice. As put by one faculty member, “It was quite by chance that I ended up in academia. I never had a plan for that - it just kind of happened, which is not good... But it worked for me”.

This following excerpt from an interview with another faculty member also echoes the same situation:

INTERVIEWER: And how did you learn to teach?

FACULTY: I didn't.

INTERVIEWER: But you do [teach]...

FACULTY: Well, they just said: “Here, I want you to lecture on [suppressed to protect participant's confidentiality].” And I said, “OK, well, can you forward me the slides from the previous lecturer?”

(Laughing) Yeah, that's how it happened.

These ones were standard answers rather than exceptions when faculty members were asked how they learned to teach. Currently, tenure-track and clinical-track positions encompass most of the academic opportunities in PharmD programs (Drugalis et al., 2006). Mostly, tenure-track positions are pursued by PhD graduates that were trained in doctoral programs structured around the assumption that one will ultimately pursue a research-based career in an academic setting (Wolyniak, 2003). Similarly, clinical-track positions are generally pursued by qualified pharmacists interested in academia that completed a residency training highly focused on patient care responsibilities (McNatty, Cox & Seifert, 2007). In both situations, then, the task of preparing new faculty for

teaching roles may be overlooked (Romanelli, Smith, & Brandt, 2005; Wolyniak, 2003).

The examples shared by the participants clearly illustrated this problem:

I've taken this faculty position and I graduated with a PharmD. I went to school for pharmacy. I didn't go to school for teaching, right? A lot of this I have to observe and read books and be part of teaching teams and learn from other faculty and mentors and things like that. – Faculty A.

This is how I got into the Early Career of Teaching program, because they were like: "Do you feel like you know your area of expertise, but you don't know how to teach it?" And I was like: "Yes, that would be me!" – Faculty B.

There is no doubt that the integration of research and clinical experience into teaching the PharmD curriculum is considered a cornerstone to effective instruction and educational innovation. However, as precisely put by Romanelli et al. (2005), "great experts do not always make great teachers." In fact, the quality of the interactions in the classroom and the instructional strategies used might influence the accomplishment of the desired outcomes in the educational process. Romanelli et al. (2005) suggested that clinical and research-based careers are the ultimate goals of residents and doctoral candidates when they reach the job market. However, may teaching be one of the components of their job, they ought to consider ways to supplement their education with experiences that directly complement their skills as educators (Wolyniak, 2003; Romanelli et al., 2005). This student's reflection is well aligned with this discussion and justifies the need of further training professors in educational strategies:

But why are we so slow in actually incorporating that [higher order thinking skills from Bloom's taxonomy] into education? My opinion is

because our teachers aren't teachers. Anybody can sit in front of a classroom and talk about what they know. They're masters in their content area. They are not masters in the delivery of their content. To me, a teacher is somebody who can make something accessible to a variety of different learning styles, to a variety of different peoples and backgrounds.

– *Student, interview.*

In fact, Blouin et al. (2009) contended that the most significant hurdle of higher education is the fact that most faculty members populating the educational institutions have not been trained as educational scholars. They are quite comfortable pursuing scholarship in their specific areas of expertise, but they almost never have experience, expertise in issues related to teaching and learning. The AACCP recommended already in 2009 a higher investment on teacher's preparation and scholarship on teaching in order to determine the usefulness and applicability of novel instructional strategies to pharmacy education, but the literature published on this topic is still scarce to date.

Pharmacy education has undergone a tremendous transformation in the past decade in terms of the content included in the curriculum. Driven by the profession's aspirations for a larger role in healthcare, schools and colleges of pharmacy responded to the ACPE's call of moving the profession into the PharmD degree (Vlasses, 2010). Significant changes were made in the content and structure of the curriculum and innovative strategies were proposed to meet the challenge of preparing new pharmacists to the endeavor of "providing patient care that ensures optimal medication therapy outcomes" (ACPE, n.d.).

It would be natural to expect, then, that the pedagogical strategies and instructional approaches used in the classroom to deliver this new curriculum would follow along, building on the wealth of literature available on curriculum and instruction to help prepare these future professionals to respond to the new societal demands. However, this was not the case for most of the faculty members interviewed in this research. When describing why and how they teach in the classroom, professors stressed the importance of previous teaching and learning experiences in their own teaching style.

I pretty much teach the way I would like to be taught. – *Faculty A.*

And I took a class with this guy during an election year. It was just hilarious. It was great. So, I wanted to teach like that. I'd think: "If I ever teach, I'm going to teach like that". At the other end of the spectrum, I had courses that were so boring that they were painful. And I would catalog, too: "OK, if I'm ever teaching, I'm not going to do that." – *Faculty B.*

Since undergrad I have been a tutor and a teaching assistant and I think what I do is a mixture of what has worked: how I like to learn and my observation of other people teaching when I think they are a good teachers. – *Faculty C.*

Previous experiences, when taken under reflection, are certainly a very important factor that shapes one's teaching philosophy and approach in the classroom and can contribute to its improvement. However, given the profound transformation of pharmacy education in the past decades, faculty members are likely to have been trained in a different model. Moreover, professors' learning styles might differ greatly from current students' preferred ways of learning. These factors only reinforce the need to use caution

when relying on previous experiences as a way to guide professors' approaches in classroom nowadays.

Part art, part science, it is natural to expect that teaching requires continuous practice and search for improvement in order to be mastered. Axtell (1998) eloquently summarized this point:

Professors must not only show their students the extent and depths of their disciplines, they must also do so in a way that wins and nourishes their attention and their respect if not enthusiasm for the subject. Thus, no matter what subject they teach, professors must master both its science – its constantly evolving disciplinary codes, literature, and methodologies – and the art of teaching it effectively and memorably. (Axtell, 1998, p. 9)

In order to develop their teaching skills, interviewed professors mentioned courses, workshops and lectures as means to gain more knowledge on teaching strategies.

I think it wasn't until I started going to some of this other coursework on teaching that I was more intentional, like: "I am going to try this technique on these students now", and then I would do it. What happened before was just kind of—I just did it. I didn't really think about it. I didn't have a language about it and I still don't, really. But I am definitely interested in learning more about how to be more intentional if there are things that are known to work better than others and I'm willing to adapt. – *Faculty A*

Many of these techniques I've learned from attending American Association of Colleges of Pharmacy meetings, going to workshops on teaching. Some of it I picked up from colleagues, but much of it I picked up from going to AACP meetings. It's a teaching technique that resonates with me - it's how I like to learn. – *Faculty B*

I am always trying to improve my teaching, so I do go to some of the [Seminar series organized by the College of Pharmacy]. They offer some seminars and lunch and learning, so I do attend those. I have attended teaching things at AACP meetings. I always am willing to try new techniques. Oh, and on ASHP [American Society of Hospital Pharmacy] I went to some teaching and learning seminars as well. So I don't know. I think it is just doing it and it is just practice. You try something, you see if it works and if it doesn't, you do something different. – *Faculty C*.

The majority of higher education institutions offer resources and workshops for training the teaching workforce and fortifying its members' overall teaching skills (Wolyniak, 2003). The importance of these activities to maintain high quality teaching standards is unquestionable. However, the question of whether those initiatives are enough to fulfill the needs of a more specialized, long-term training for higher education teaching workforce in healthcare remains unanswered. But one thing is clear from the literature: to avoid obsolescence and boredom in the classroom, every course should be continuously updated, reconfigured and rejuvenated not only in its content, but also in the light of new or more effective pedagogical approaches available (Axtell, 1998). Considering the profound transformation of pharmacy education over the past 10 years, this need becomes even more prominent.

When it comes specifically to critical thinking instruction, most of the available literature focuses on what to teach rather than on how to do it. Some authors have discussed strategies to improve critical thinking in the classroom (Powers & Jones-Walker, 2005; Austin, Gregory, & Chiu, 2008; Earl, 2009); others have reported the results of strategies applied (Bartlett & Cox, 2002; Miller, 2003; Cisneros, 2009), but

very few papers bring up the topic of teacher's preparedness to respond to such difficult task (Mangena & Chabeli, 2005). Even the AACCP Academic Affairs Standing Committee refrained to comment on this issue in the environmental scan on the status of critical thinking in colleges and schools of pharmacy published in 2010. The findings of this study suggest, though, that critical thinking is not only a difficult idea to conceptualize, but it is also a very challenging subject to teach.

That's probably one of the biggest things you can teach pharmacy students but it's probably one of the hardest or the most difficult. – *Faculty A*

You're always confronted with very unusual situations... Sometimes there aren't answers, but you're going to have to look for them and you're going to have to think about them. Other times you're going to have to create things. Like you are going to have to take what you've got and turn it in to something else. And I don't know how you teach that always in the class.

– *Faculty B*

I don't know if there is a critical thinking paradigm or matrix, in terms of what they [students] need to do to be able to demonstrate that they're critical thinkers. What are the components of critical thinking and how students would demonstrate that they are critically thinking? I don't know those things off the top of my head, I would have to put a lot of thought into it. – *Faculty C*

Mangena & Chabeli (2005) conducted a study to identify strategies that facilitated critical thinking instruction in nursing. These authors described the “educator’s lack of knowledge” as one of the hurdles in the process. According to them, educators reported to lack knowledge on instructional strategies that are more likely to foster inquisitiveness

in the classroom. They also reported a poor understanding of critical thinking skills and dispositions and, as mentioned by one of the participants in the study, “one cannot teach critical thinking if one is not a critical thinker herself” (p. 293). While this might not be the case in the present study, the importance of providing faculty members with the necessary tools to teach critical thinking in an effective way should not be overlooked. Further preparation on evidence-based educational methods (Davies, 1999) and a clearer understanding of critical thinking as a desired educational outcome in pharmacy could certainly help address the uneasy feeling experienced by the participants in this study. After all, modeling and coaching critical thinking skills in the classroom requires profound familiarity with the subject from the professor’s side, and ability to reproduce it not only in words, but also in actions in the classroom (Chaplin, 2007).

When the pharmacy profession decided to change its focus from dispensing drugs to providing clinical care for patients, it inevitably subscribed to the perils and promises of educating new pharmacists to the complex dynamics of the clinical encounter. Most faculty members involved in this study mentioned value biases in diagnoses, cultural factors, and patients’ subjective characteristics as important factors to be taken into consideration while thinking critically in the care process. Although important to clinical practice and to the development of critical thinking skills (Facione & Facione, 2008), these domains are not easy to be taught and several professors acknowledged grappling with them in the classroom.

It is a real problem, and so we want this elusive thing [critical thinking], but we’re not really sure what it looks like. And we want these pharmacists that can think critically or think clinically, but we’re not

comfortable. We're not comfortable with that variability in the answer. Because, then, "why do we spend all this time on the content if there are three or four different ways to handle it"? So what does that mean? How do we transition from these kinds of pockets of knowledge – which are important to start with – to get them to be more fluid and OK with this gray?... It is a hard question. – *Faculty*

There are numerous challenging factors involved in the clinical decision process. Ambiguity and uncertainty related to the subjective dimensions of the clinical encounter are very important ones (Dogra, Giordano, & France, 2007). Therefore, comfort with this ambiguity and recognition of uncertainty as an inherent characteristic of particular domains of patient care are crucial factors in preparing health professionals to provide biomedically correct and ethically sound patient-centered care. As highlighted by the professor quoted above, there are several questions posed in this field to which pharmacy education still did not find satisfactory answers to.

Other professions have also been dealing with the issue of uncertainty in healthcare for decades and they have made significant contributions to the body of literature in this field (Cranley et al., 2012; DeForge & Sobal, 1989; Mishel, 1981;). Most of them agree that a well-designed educational program might have a positive impact in assisting healthcare professionals to develop skills to deal with the conundrums of clinical practice. In order for this to happen, I argue that educational institutions should not only focus on revising and improving the curriculum, but they should also pay close attention to their workforce, making sure that they are aligned in terms of what to teach and how to do it. Ultimately, this alignment can positively influence the achievement of desired

educational outcomes and result in higher satisfaction from teachers and students perspectives.

Meet the Learners

When discussing teaching and learning, it is important to recognize that the talents students bring with them might have a profound influence on the outcomes of the instructional process. Among those talents are dispositions toward the way they organize, recall, and think about new knowledge (Heywood, 2000). Students in this research offered their perspective on why critical thinking is a hard subject to learn in the classroom and they started by highlighting that they all have different and unique ways to learn.

I think it depends on your way of learning too, because some people might sit there and just be lectured at. That might be their creative way of learning critical thinking, because they're able to process the information and retain it at the same time. But others will prosper in small groups, by verbalizing and by pulling different ways of learning, like writing stuff down, rather than just being taught at. I think it's really personal.

– *Student, focus group.*

I'm not an auditory learner, I'm a visual learner, and so I need to be by my computer and I need to look at the slides. – *Student, face-to-face interview.*

Dunn et al. (1990) defined the term 'learning style' as different and unique ways used by individuals as they prepare to learn and recall information. Much has been written about the implications of learning styles on the teaching/learning process. It has been argued that knowledge of learning styles can be a successful tool in the classroom

for both teachers and students. Teachers can apply this knowledge to optimize learning by tailoring their pedagogical approaches to better fit the learning styles of students. Similarly, students who are aware of their learning styles can be empowered to identify and use learning techniques best suited to their individual ways to learn (Samarakoon, Fernando, Rodrigo, & Rajapakse, 2013).

According to the findings of this study, most students are aware of their learning styles. Besides the great variability in their learning preferences, they shared at least one opinion: the material must be engaging. According to them, the engagement comes from connection with real life experiences, connection between classes, and connection with the patient, who was always at the center of student's interests. The question of whether they are getting what they need in the classroom in order to feel engaged did not receive a unanimous answer, which is understandable, since they all learn in different ways.

There is a wealth of information regarding the assessment and use of learning styles of pharmacy students to improve the outcomes of the instructional process (Lubawy, 2003; Pungente, Wasan, & Moffett, 2003; Novak, Shah, Wilson, Lawson, & Salzman, 2006; Romanelli, Bird, & Ryan, 2009). As suggested by Romanelli, Bird, and Ryan (2009), learning styles may become an increasingly relevant pedagogic concept as classes increase in size and diversity. Students come to professional education with a varied ethnic and cultural background, different levels of previous experiences and with differing learning styles. Besides that, the expansion in the types of instructional media used to deliver the curriculum adds one more layer of complexity to the dynamic of teaching/learning process. In this scenario, the importance of understanding how students

learn and leveraging it to achieve best outcomes in the classroom becomes paramount (Romanelli, Bird, & Ryan, 2009).

Another remarkable trait of the students who participated in this research was what they named ‘grade mindset’. According to them, accumulated experiences with the educational system have led most of them to think that their grades speak directly to their performance in general and to their sense of competence and self-worth:

I used to be one of those grade people because that’s ingrained in you from the time you’re a little kid. You get a report card and your parents judge how you’re doing based on your grades. And you get a grade and you move to the next level. And you get another grade, and you move to the following level. And that essentially becomes, for a smart person at some point in life... (pause). I think their self-esteem becomes based on that, on their GPA. – Student.

Professors and curriculum stakeholders strongly corroborated that perspective:

Well, it’s not just even our system here at the U; it’s how they’ve been trained throughout, through grade school, through high school, through college – it’s all about getting that A. – *Faculty*.

Well, I think that they have been competitive their entire undergraduate careers. To get into a professional program, you have to have this GPA and you have to do this and you have to be involved in that. And they are competing with each other to get to the next step, too.

– *Curriculum stakeholder*.

According to the students, the unintentional result of an educational system that homogenizes the concept of ‘high performance’ without questioning its motives is a high

focus on “temporary achievement” – i.e. high performance on formal exams – that may or may not be translated into best practices in the real world.

I think along those lines we focus too much on the grade in school rather than actually learning the proper depth of knowledge and getting the right experiences. We’re too focused on “I don’t want an S-” and “I want to get A’s”. And because of that you lose sight of actually getting depth of knowledge. We’re like “oh, we were just talking, this probably won’t be on the oral, we don’t need to learn it.” We still need to learn it! We’re too driven by grades I think. – *Student, focus group.*

They’re so used to “What do I need to know to pass the mid-quarter? What do I need to know to pass the final?” Well, when you’re a third year student about to go on rotations, that should not be the question. “What do I need to know for the next patient I’m going to see? What do I need for the next patient?” And that doesn’t happen...because they’re so reinforced by their grades. – *Faculty.*

As well conveyed by another professor, “patients don’t care about points”.

Therefore, the fact that students have been unintentionally trained to think that the purpose of going to school is to get high grades should be a point of concern for educational institutions. I further explored the issue of assessment as a hindering factor to the development of critical thinking skills in the sub-section “Disconnections in the Classroom”.

According to the findings of this study, it is clear that students begin their professional training fairly shaped by their previous educational experiences in a system that reinforces the binary approach to answers. Using their own words, they are capable and well qualified to identify “black and white”, but the shades in between are hard to

deal with. In this sense, professors and students were in agreement regarding their discomfort with the uncertainty issues.

You can always tell when there's critical thinking going on, because it's like that gray area that frustrates everybody. As a profession, we like guidelines and we like definite answers and we like black and white, and when something is kind of unsure or it doesn't have an exact answer and it's something that you need to use critical thinking to decide, everybody goes: "I don't understand!" And you can just sense the frustration in the classroom when that goes on. So it's always easy to identify when it's happening." – *Student, focus group.*

In fact, I have plenty of entries in my field notes describing this feeling of uneasiness experienced by the students. In one of the classes I observed, they manifested their dissatisfaction when discussing "less scientific approaches", such as complimentary care therapies. Also, disputes would frequently take place regarding a grade attached to a specific "gray situation" in clinical cases, that gray situation frequently being some factor associated to the patient's social and/or cultural background. Students spent a great deal of time in those classes discussing clinical cases and learning to prepare a holistic, comprehensive, patient-centered care plans. The instructors would provide the care plan rubric beforehand, so students could have an idea about the criteria used to grade their work. The discussions that would take place after the care plan grades were released were often the most heated ones. The main argument in those discussions was the "lack of clarity" regarding what should be considered "essential in order to get an S+". From my

observations, the grading system was playing a considerable influence in how these students were dealing with subjective issues.

In one of those classes, students were asked in the middle of the semester to write about what was working in the class, what was not working and to offer some suggestions for improvement. The course directors intended to use the students' feedback to improve the class design during the second half of the semester, tailoring it to the students' learning needs. The majority of the students' feedback focused either on the used grading system or on the frustrations when dealing with cases that could have multiple answers and not necessarily an "ideal" one. Below are some examples from the student evaluations:

A bullet point list of all things required in SOAP notes by category would be nice (grading explanations not needed, just a list of everything you need for a "spot on" [grade]).

The class is confusing and the patient interaction sessions are very frustrating. Also, I would like to see a key for each SOAP Notes care plan, so that way I have a better idea of what is expected for an ideal care plan.

During the interviews and focus groups with the students, I further explored their discomfort with uncertainties inherent to patient care. I was interested in understanding why they were having such a hard time in thinking outside the binaries and exploring possibilities beyond the criteria listed in exercise rubrics.

That's why I had a hard time at first with [required course that teach principles of direct patient care], because I think I need a rubric, I need a formula and I need something to tell me if the patient is having this, then I

should do this, and if that doesn't work then I need to go to C. So it's really a brain stretch for me, to start learning to think this way. – *Student, focus group.*

Some professors felt under considerable pressure to provide the 'right answer' when teaching skills related to patient care. Students' discomfort with uncertainty was felt by some faculty members as a driving force towards factual emphasis rather than reflection. These issues are similar to the findings described by Dogra, Giordano, and France (2007) when studying the problems related to uncertainty in medical pedagogy. This professor shared his reflections on the topic during an interview:

The point is, the protocol says that somebody who is in the 50-55 age range should do X, but what if they are 49? When do you cheat and put them in to that group? How do you make that decision? What is magical about turning 50? I'm different at 50 than you are at 50. So how do you make those choices? How do you know where that spill over, gray area is? And that's the kind of thing that when you are talking to them [students] about something, you almost have to give them some absolutes. It's very difficult to talk in ambiguities. But the ambiguities is what they have to deal with.—Faculty

Professors were also in agreement that the traditional education system contributes to the dualistic approach adopted by pharmacy students in the classroom. In addition, they also believe that students who choose pharmacy as a profession share a common "personality trait:"

They [students] tend to get that through their multiple choice education. Our thinking unfortunately, in earlier stages of education, is fairly based on that right answer kind of thing. You know, A-B-C- or D and one of those is right (...). But if you really

look at the strengths' finder, a lot of pharmacists and pharmacy students have 'analytical' as one of the high, high pieces in there. And definitely faculty do in that situation, too. We enjoy figuring stuff out. – *Curriculum stakeholder*.

So there's definitely a left brain kind of preciseness that I think is somewhat inherent in most people that come into pharmacy. I think that we tend to have that kind of... We like it because it seems to be fairly precise." – *Faculty*.

Regardless of the possible "selection bias" suggested by this last faculty member, it is important to focus on the possible impact that the professional curriculum might have on this process. Pharmacy education may enhance this bias through training effects, by disregarding subjectivity and thereby fostering the misguided assumption of objective certainty in pharmacy practice related to patient care. Although many professors acknowledged the importance of uncertainty in clinical practice, they also admitted to do not know how to deal with it in their teaching. There needs to be a pervasive understanding of uncertainty and ambiguity as inseparable aspects of patient care delivery among faculty, students, and curriculum stakeholders and this understanding must be incorporated in the teaching strategies used in the classroom in order to propel forward the concept and practice of pharmacy as a patient-centered profession.

The Good, the Bad, the Ugly, and the Room for Improvement in Teaching and Learning Critical Thinking

Far from reinforcing slanted views of teaching strategies – which, in my opinion, don't lead to better outcomes – I decided to focus on what is working, what is not working and what could be improved given what I have learned throughout the research process. According to the participants' narratives, each method has, in its midst, the potential to foster or hinder critical thinking skills and dispositions in pharmacy.

No single teaching method carries in itself the formula to succeed in effective curriculum delivery. The achievement of learning outcomes depends on the teaching strategies used and on the way they are applied in the classroom. Case studies, small group discussions, simulations, and lectures were mentioned as examples of methods that could result in success or failure, depending on when and how they were applied. Apart from that, I addressed, at the end of this sub-section, some gaps identified in the practices adopted in the classroom. I pointed out some issues that, if properly addressed, might contribute to the improvement of the curriculum delivery process.

As I mentioned above, independently of the teaching method used, engagement seems to be *sine qua non* to critical thinking:

I would have to say that students tend to shut down when we don't feel like we are being challenged, in a fair manner. Don't get me wrong, there is a point where you can push students too far with what you expect of them. For the most part though it is very difficult to obtain the interest of

students with material that is either review or too basic for the majority of the class. The other type of material that turns students off is the material that doesn't have a clear correlation to the real world of pharmacy. You have to make the students feel like their time is being well spent on the task at hand. I can't count the number of times my class has said "Why are they wasting my time with this?" If you cannot capture the student's attention and engage them in the material, you will never get them to think critically about it. – *Student, face-to-face interview.*

Engaged students have a sense of energetic and effective connection with the content and with the activities performed in the classroom. I also learned from my observations that it is essential to leverage students' interest on patient care to channel their energy into cognitive and emotional labor in the classroom. Russ Edgerton (2001) introduced the term "pedagogies of engagement" in his Education White paper and he wrote:

Throughout the whole enterprise, the core issue, in my view, is the mode of teaching and learning that is practiced. Learning "about" things does not enable students to acquire the abilities and understanding they will need for the 21st century. We need new pedagogies of engagement that will turn out the kinds of resourceful, engaged workers and citizens that America now requires.

There is a substantial amount of evidence indicating that instructional and programmatic interventions may not only increase a student's active engagement in learning, but may also enhance knowledge acquisition (Pascarella & Terenzini, 1991).

The task left for pharmacy educators is to identify those strategies that resonate best with students and maximize their achievements in the learning process.

Lectures: information dump or thought ignition?

During my fieldwork I had the opportunity to see some teaching methods in practice and to further discuss them with the actors involved – students and professors. I was interested to understand the benefits and pitfalls of these methods in critical thinking instruction. Lecturing was, by far, the one that evoked the wider array of opinions. It was frequently mentioned and often regarded by the participants as a “hindering factor for critical thinking”. Nevertheless, several students affirmed enjoying lecture and most faculty members admitted that they still heavily rely on it as their main content delivery strategy in the classroom. This curriculum stakeholder skillfully described the debate:

I think historically in higher education it’s been the professor lecturing to a large classroom, and there are some limitations to that, but that doesn’t mean that lecture is never appropriate. And I sit in groups, especially here at the College of Pharmacy, where people are like: “lectures are bad, we can never use lecture”. You know, it’s a weird, dogmatic opposite shift. Before we were: “lectures are it!” and then to “we can never use lectures”. That’s an extremist, purist approach to educational strategies, never the right way. There are a lot of options; we need to consider them wholly.

– *Curriculum stakeholder*

Lecture-based instructional models have been the dominant strategy in the educational field for centuries (Lowe, 2011). Early theories suggested learning was primarily the acquisition of knowledge and, since then, lectures became the most

prevailing method of content delivery (Preszler, 2009). Meyers (1986) stated that it is, indeed, a very suitable method to raise questions and present problems, provide information not available in textbooks or supplementary readings and summarize the main points of discussion. In addition, he argued, professors can demonstrate, during a lecture, how to engage in critical thinking. However, the participants in this study suggested that, in order to be an effective strategy, lectures should include interactive components.

I still do believe the best way to teach in pharmacy school involves a lecture format, but I do think that it can be modified slightly. There needs to be a serious effort to check for understanding and encourage higher level thinking made at several points throughout a fifty minute lecture. There is no reason to sit for more than fifteen minutes at a time without being asked to think on your own instead of just sitting there staring at a screen. – *Student, written interview.*

Lowe (2011) endorsed the same idea affirming that the uninterrupted attention span for adult learners is estimated to be around 20 minutes. I observed many classes that would run for 50 minutes without any attempt to create a meaningful dialogue with the students. But I also noticed that several professors tried to establish some sort of interaction during their lectures, as shown in this field note excerpt:

(...) Lecture goes on with no interaction with the students: 20 minutes into the lecture and not even one single question rose yet. The only ‘breaks’ in the professor’s monologue are in between the sips she takes from her water bottle. After 32 minutes of class, she says: “let’s talk about this in a format of a case now”. She reads the case on the slide and asks the students: “what diagnostic procedures and treatment would you guys indicate here?” Nobody answers the question out loud. Few students

mumble answers between themselves. Less than 5 seconds later, she goes ahead with the next slide, discussing lab exams and the use of specific treatments that answer the case. (Field notes, February 2012).

I observed that, like this lecturer, many other professors meant to be “interactive” in the classroom, but they were not successful in providing time and space in their lectures for students to interact. I was curious to learn what was leading professors to adopt this approach in the classroom. During the interviews, faculty members shared their concern about the low participation and engagement of students in their lectures. They were aware of the importance of interacting with students in the classroom to achieve effective learning. When asked about possible reasons for this low engagement, some of them offered more insights:

You know, it’s somewhat hard to teach it [critical thinking] in a lecture setting, just from the standpoint of the time that you have in lecture to give them [students] those basic building blocks. That’s what you’re focusing more on. I do try to do at times, you know, ask them open ended questions to kind of get them to think. But then, again, we talked about how it’s hard to get them to respond. And some of it too is, you know, you’re trying to get them to take the information they just learned and process it. And for some people, it doesn’t integrate right away. They have to sit down and look at it, spend time with it. – *Faculty*.

Lowe (2011) argued that there is a subtle assumption that the information delivered through lecture will automatically be translated to functional knowledge or specific skills. However, as suggested by the faculty member quoted above, simply giving information might not be sufficient for an individual to have learned. Students in fact need to “spend time” with the information, apply it, synthesize it, use it in different

contexts before claiming to have learned it. Another important point made by the faculty members was that there was too much to be taught, but the time with the students in the classroom was short and limited. In their experience, time constraints in the classroom – added to the large volume of content to be delivered – clearly posed some limitations to the use of lectures as a way to foster critical thinking.

Even with these limitations, it is important to highlight that some professors who used lectures in the classroom were regarded by the students as extremely successful in their teaching strategies. They are the ones offering advice on how to meld strategies in the classroom in order to increase engagement during lectures:

One of the things that I will do is when I throw a question out for students, I will have them take out a sheet of paper; do not put their name on it. Take out a sheet of paper and I'll ask them a question and I'll ask them to write about it. Two or three minutes - it depends on the question. And then I'll ask, "OK, what did some of you write down?" And it's always easier for someone to have thought about it, written about it a little bit, and then they'll be able to say, "Oh yeah, this is what I wrote," instead of just calling on people cold... Because then you would get no answer.

– *Faculty.*

Case studies: choices to choose or chances to learn?

Case studies were also mentioned by the participants as a successful strategy used to raise students' interest, accountability, and engagement in the classroom. This faculty member explained why case studies were so effective for her own learning and her experience resonates well with most participants:

I don't know the literature on education so I'm not knowledgeable about what studies have been done to prove something or not prove something. I can say when I was in pharmacy school we had a specific course that we only did cases and it followed along with [lecture-based course]. And I honestly don't remember much from [lecture-based course], but I remember the stuff we did in the cases. We would sit in groups. There were six of us. We would sit around. They [professors] would hand us a case and we'd sit there and talk and figure: "OK, how are we going to treat this patient? What's going on here?" And those were the things that burned it into my long-term memory as opposed to [lecture-based course], where they'd just say, "Memorize all of this and take the exam." They have to teach us that base level of knowledge, of course, I get that. But I think if you can get an application involved in addition to memorizing, I think that's probably really essential. – *Faculty*.

Students also expressed their predilection for classes that would use case discussions as a teaching strategy:

Case studies also foster my critical thinking. Some materials seem abstract and hard to understand. Case studies act as a catalyst that helps me understand the materials better with real situations rather than abstract concepts. – *Student A, written interview*.

These complicated cases and the accompanying written SOAP notes fostered critical thinking in that extensive knowledge of multiple medications and disease states were required in order to solve the drug therapy problems. I remember often spending several hours reading over the case, reviewing the condition and associated medications, and many times searching primary literature to find support for any therapeutic decisions that I made. I would approach the problem from several angles in that I would try to think about making changes from the perspectives of

the caregiver, patient, and the patient's family. Consideration of cost, side effects, overall effectiveness, and convenience was necessary in order to come up with the best answer. I would also discuss these cases with colleagues, and we often came up with differing approaches to solve the problem, which sparked additional discussion and debate regarding the best course of action. These discussions led to even more critical analysis of the patient cases, and they would often yield valuable information both to me and my colleagues. – *Student, written interview.*

If reading, arguing and challenging are hallmarks of critical thinking, then case studies are likely to be a useful tool, since they foster inquisitiveness by requiring careful attention to details and precise, step-by-step reasoning (Grossman, 1994; Herreid, 2004). Factual information is available to virtually everyone almost instantaneously. Therefore, the focus in the classroom should shift from the transmission of factual information to the use of methods that will challenge students to think critically, to communicate coherently, and to apply their knowledge in effective and strategic ways (Blouin et al., 2009).

Similarly to case studies and small group discussions, simulations, jigsaw methodologies, team-based learning, and the use of technology – such as internet search engines, blogs, and online forums – were also regarded as successful strategies to simulate real world experiences. In addition, these methods fostered discussions and collaboration, provided opportunity to learn from each other's experiences, and held students accountable for their own learning, in the participants' experiences. Faculty, curriculum stakeholders and students all agreed that those are essential elements in an environment conducive to the development of critical thinking.

I frequently heard from professors during the interviews that they would use “case

studies” in their classes to increase participation and stimulate critical thinking. They also described the use of short cases, embedded in their lectures, as an instrument to engage students in discussion and to break the pedantic tone of “plain lectures”. During my fieldwork I had a chance to see their words in practice, as they would attempt to incorporate different teaching strategies to improve participation in the classroom. What I observed in the classroom, paired with the experiences reported by the students enrolled in those classes, suggest that the strategies described by some professors were not as effective as they were intended to be:

STUDENT 1: Off of what [student 2] said, when you’re sitting in [discussion-based course], you’re actually expected to talk, you’re being asked questions. Versus in a lecture, nothing is really expected of you other than just sit there and pay attention or try to. I think that’s another reason why lectures sometimes move away from encouraging critical thinking. Oftentimes, the cases you do in lectures, they have choices. Not always, but sometimes, there will be multiple choice, and then they [faculty] don’t really give you a lot of time to think about what the answer is." – *Student, focus group.*

(...) The lecture goes on and the class is silent, students keep following the slides and taking notes. I can hear the sound of pages turning as the slides go by (...). After about 20 minutes of uninterrupted lecture, the professor says: “I will give you guys a couple of minutes to discuss the efficacy of [pharmacological treatment] for this patient” and he proceeds to project a slide full of information on the screen. There is no interaction between the students and I’m half way through reading the case when he goes ahead: “it is clear from this case that the patient experienced some undesirable side effects from [pharmacological treatment]. How many of you guys

think that this treatment was effective?” No hands up. “Who thinks that the treatment was effective?” No hands up. The professor looks around and goes on: “So everybody agrees with ‘no’ then? Alright, the treatment was not appropriate because...” (...). The next slide is a short case with a question and 4 options. He reads the question and asks the class: how many of you think A is the best answer? (no hands up). B? (no hands up). How about C? (no hands up). Maybe D? (no hands up). The professor, acting as there was interaction, goes ahead: “yeah, it seems like option C is the most suitable in this case, because...” (...) – Field notes, April 2012.

Although the discourses of faculty and students are very well aligned in terms of supporting case studies as an effective teaching strategy, the findings indicate some divergence between the expected outcomes and the actual results of that strategy. I’m convinced that teaching in the college classroom is becoming increasingly complex. Professors are expected to skillfully and uneventfully deal with increased class sizes, higher diversity of students’ learning styles, and the recent technological boom that stroke the classroom in the last 20 years (Meyers, 1986; Bonwell & Sutherland, 1996; Lowe, 2011). Even though the participants are in total agreement that students’ engagement is *sine qua non* for learning, the challenge remains on choosing and effectively applying methods that meet the learning objectives for the class, fit the professor’s personal level of comfort with various teaching strategies, and furnish sufficient support for students so that active learning can take place (Bonwell & Sutherland, 1996).

“Students don’t like critical thinking”: the reasons behind the whining

Nowadays, professors are required to deal with the hurdles of designing effective teaching strategies that are likely to fulfill the expectations of the contemporary higher education. Besides that, faculty members argued, they also need to manage the distress provoked by their attempts to try something new in the classroom, “new” frequently meaning “other than lecture”. Actually, many professors commented on a perceived pushback from the students when they experimented with some innovative teaching strategies in the classroom.

RESPONDENT: So, I think that [team-based learning] was accomplished. Did students love it? No! (laughter) Some of them wished they had traditional lectures and they didn’t have to work before coming to lecture.

INTERVIEWER: Really?

RESPONDENT: Oh, sure, sure. Yeah. I’m sure it’s mixed feedback of people liking it, not liking it. Especially in a bad week, with many exams... Then it’s just another thing they have to add to their list to prepare for, right? – *Faculty*

It’s hard. The first few times I did that [used google sites in a course], I had a lot of students saying “this was so hard, I would just have been so much happier to take a multiple choice exam”. And it is really hard to do it, but I always had students say that it completely shifted their thinking, which is what I wanted. So you have to, as an instructor, you have to put up with some whining maybe or some pushback. – *Curriculum stakeholder.*

The pushback from students was understood by some professors as “students don’t like critical thinking.” In one of the interviews with a professor, he shared this

view: “With that said, students don’t like critical thinking. There are lots of times where if you give them a situation where they’ve got to think about it, they’re not happy about that”. The idea that students don’t like critical thinking pervaded the discourse of many faculty members and curriculum stakeholders. In their views, every time that they would try “new” or innovative teaching strategies that were likely to foster critical thinking, students would respond with complaints, whining in the classroom and a negative teaching evaluation at the end of the semester. Professors frequently reported feeling frustrated and discouraged to experiment with other instructional methods because of this perceived pushback from the students.

There was a feeling that it [problem-based learning] made them work harder. And they didn’t like the format for some reason; they were complaining. I’m not sure I totally understood it, but it frustrated me enough as an instructor that it wasn’t worth my time to bother with this; they [students] were upset. – *Faculty*

Given the high impact of these negative experiences on the professors’ motivation to implement instructional activities that could foster critical thinking, I became curious to learn, then, from the students’ perspective, what was going on. In the focus groups and interviews, I would share with the students these preliminary findings – the pushback experienced by professors and their consequent understanding that students don’t like critical thinking – and I would ask their input. Their first reaction was to admit the whining:

So I think it’s good that sometimes we’re pushed and even if people complain, I don’t necessarily think that’s a bad thing. I think we just like to complain about things sometimes. – *Student, focus group.*

But students went beyond acknowledging the whining in the classroom. They also presented their perspective of what could be causing this pushback experienced by the professors. One frequent explanation was the fact that they were not used to learning activities that would require a whole lot more than rote memorization and unreflective recitation of facts.

Our whole educational system right now is based upon a very outdated model, I feel. It's like students aren't used to it. It's like anything: if you're not used to something, it's going to be an adjustment period. Students may not like it [innovative teaching strategies that are likely to foster critical thinking] in the sense that it's new to them. They're not good at it. They're not using the areas of their brain that they'll eventually use out in practice. – *Student, interview.*

I think we will like it [critical thinking] once we get used to it. I think the problem is that we're not used to it, because the expectations for studying and what school is going to be like are set up completely wrong in the first year. The first year is about getting everybody on the same page, everything is very A, B, C, and D. Everything is very black and white, there's not a ton of case discussions other than in Pharmaceutical Care [required course focused on pharmaceutical care practice]. So I think everybody would be a lot more agreeable to this type of learning if it was the expectation from the start. – *Student, focus group.*

Students also suggested that it might also be an issue of misunderstanding of what critical thinking means for both professors and students. They reinforced the need to close the gap in understanding what critical thinking means to pharmacy practice because multiple definitions might weaken the common efforts that are needed in order to foster those skills in the classroom.

Lastly, students pointed out that professors might be actually struggling with the changes brought by the contemporary goals and purposes of higher education. According to them, the complexity of the current healthcare system and the problems associated with it require prepared professionals to integrate the content in a meaningful and contextualized way, aiming to solve problems and optimize healthcare outcomes. The traditional methods of curriculum delivery and assessment might not be the best pathways to prepare contemporary professionals. Students are aware of the difficulties involved in adapting the educational system to this claim and they suggested that professors might be actually grappling with their own lack of preparation to deal with these new demands from the classroom. This excerpt from a focus group illustrated the students' thoughts:

STUDENT 1: I think the reason why [some professors suggested that students don't like critical thinking] it's because it's tough to design classes in a way to make it (A) that we care about it, and (B) that we learn something from it. I think it's really tough for professors or for anybody to design something that's engaging in both ways.

STUDENT 2: That's true. But if we learn something from it and enjoy it, we're engaged a hundred percent. I would rather have that. But the hard part is as a teacher, I know it's easy to make excuses for why you don't want to do things, because it's really hard to design something.

STUDENT 1: I just think it takes a very good educator to make critical thinking successful in a classroom.

Apart from the struggles to teach critical thinking skills in the classroom, it is reasonable to affirm that it is not the lecture, the team learning or the problem-based method itself that will necessarily enhance student learning. I argue that it is far more

important to know how to use these teaching and learning strategies to support learning outcomes that are integrally linked to the student as a creative, practical, and critical thinker.

Clinical guidelines: hindering, fostering or stifling critical thinking?

Participants frequently mentioned the central role played by guidelines in the teaching-learning process of becoming a pharmacist. However, opinions regarding their usefulness and applicability – in the real world and for learning purposes – varied among faculty members. Some of them believed that guidelines were a good way to teach critical thinking, as long as the students commit to stay updated:

Pharmacy constantly is going to change, but we want them to focus on the guidelines. We want them to be able to reference them well and look them up well. But, I also want them to be very comfortable that this is going to change every year and you have to look up. You have to stay current and if the last time you looked at the guideline was two years ago, you can't. Even if you have a great memory and you remember it, you really have to continue to look for updates and be aware that medicine is always changing. – *Faculty*.

Guidelines have become a familiar part of clinical practice. They influence decisions at the bedside, rules of operation at medical facilities, and health spending by government and insurers. The Institute of Medicine defines them as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (Field & Lohr, 1992). Although the idea of instructing by the guidelines was popular among many faculty members, some of them

offered another insight on what education should encompass in order to foster critical thinking. In their opinion, students should develop the ability to think beyond a guideline.

There are the treatment guidelines, but then there's the patient. And the patient is not the treatment guideline. So you have to decide, "OK, this patient has got three other major disease states going on and we didn't really cover it in oncology how to treat a diabetic with congestive heart failure. Do we give them the full dose of this drug?" I mean, that's an example and the treatment guidelines have nothing on that. And so they have to know things and think about, "OK, what do I need to know here to be able to answer that question?" and "Is all of that knowledge here or is it not here?" – *Faculty*.

From that stand point, you can be very simplistic in your approach to a hypertensive patient. Somebody can go down the criteria from the JNC7 [The Seventh Report of the Joint National Committee of Prevention, Detection, Evaluation, and Treatment of High Blood Pressure] and say, okay, here's the drug you should have. There's not really much critical thinking in that. That's analytical. It's just like listing each of the things that are going along and you fit them into the criteria. It's like following an algorithm. But the critical thinking part comes, when you realize or even part of it is realizing that people don't always fit into an algorithm. You know there are pieces and things that you have to say well, because she's so and so, this may not be the best answer for them. So, it's, it's getting a little bit more of a higher complexity, than just the yes no questions for following an algorithm. – *Faculty*

Facione & Facione (2008) remind us that these documents are elaborated and raised to the status of standards when the consequences of an error are high. However, they emphasize, there is still need for reflective thought when using these guidelines and

protocols to assure that they remain suitable to each specific case. During the interviews, students were categorical and unanimous in their opinion about the guidelines. They felt that, depending on how it is taken, it might even hinder critical thinking:

Sometimes I feel like we learn the guidelines so much that it eliminates some of the critical thinking. So then it makes me think critical thinking is almost digging deeper into these guidelines. Because when we think in terms of patients or any other way you can think about guidelines, I guess, we can't just match a number with a patient or a treatment with a number. There's a lot more that goes into actually coming up with your assessment and your plan. So in terms of pharmacy school I feel like sometimes the guidelines prevent a level of critical thinking. We're taught too much to go by the guidelines. – *Student, face-to-face interview.*

This topic was mentioned in every focus group and in several individual interviews and all students were in agreement that the emphasis put on learning guidelines is not always counterbalanced with the focus on the specificity of each patient. Woolf et al. (1999) discussed extensively the potential limitations and harms of guidelines in clinical practice. Among various issues, they stressed that the frequently advertised benefits of clinical guidelines – such as more consistent practice patterns and reduced variation – may come at the expense of reducing individualized care for patients with special needs. This student offered an insight of how education might have unintentional effects, depending on the type of methodology we use to instruct or assess learning.

So I think [critical thinking] is thinking outside of the guidelines, utilizing other resources. I think in school it's easy to get trapped by the guidelines because a lot of times we're tested so black and white. So I think being

able to see while we're in school that that's not the reality of outside...

This is what I think sometimes we miss. – *Student, Focus group.*

It is important to keep in mind that guidelines are generally written by a relatively small group of expert practitioners and, therefore, they are ultimately bound to personal perspectives and biases. Critical thinking, in my opinion, should encompass only “thinking outside the guidelines”, but also critically examining those guidelines and knowing when and how to use them. The result of “teaching by guidelines” and assessing in “black and white” might have the unintentional effect of moving students away of critical thinking skills. This might have an impact on how these future healthcare professionals will interact with their patients and how much of the patient’s experience these professionals will be willing to incorporate in the care provided. The consequences for the quality and effectiveness of the care provided can be disastrous.

Curriculum Integration: Linking Content, Bridging Gaps

Curriculum integration was another subject brought up by some faculty members and students when talking about critical thinking in the classroom. They were in agreement that an integrated approach to teaching would lead to better outcomes in education. They offered substantial criticism to the way the curriculum is currently designed at the University of Minnesota College of Pharmacy, describing mainly the lack of connection between the content from course to course and throughout the professional curriculum.

I think that one of the big problems that we’ve had with our curriculum, or maybe just higher education in general, is that we talked about the

cardiovascular system like you can pull it out of somebody's body, or we talk about social issues separate from therapy. And so you have to show students that this is the whole task, this is why they're here, to care for patients, and they will not be able to only care for patients' hearts or just for their immune system. They can't just do that. – *Curriculum stakeholder*.

Right now, our classes are like high school, like we have eight different classes that don't really go together, like they have nothing to do with each other. – *Student, focus group*.

One of the downsides of the subject-centered approach to curriculum, according to the participants' experiences, is that “teaching content in isolation” have been preventing students from making connections between different subjects. According to Beane (1995), this could actually explain part of low relevance and purpose attributed by the students to certain contents learned in pharmacy education. Advocates of the integrated curriculum believe that individuals learn best when encountering ideas that are connected to one another and when they are encouraged to integrate learning experiences into their own schemes of meaning.

Much expectation has been put on the revised curriculum that will come into effect in the Fall semester 2013 at the University of Minnesota College of Pharmacy. According to the annual report published in 2011, the new curriculum will “preserve the importance of foundational, disciplinary sciences in shaping the minds of the next generation of practitioners while coupling it with real world experiences that provide opportunities to integrate and apply their knowledge and skills”.

Scaffolding: neither too simple nor too hard

According to the participants, the process of acquiring and further developing the skills and abilities needed to take care of patients is a lengthy and laborious one. In order for professional education to be successful, professors and curriculum stakeholders argued that the tasks that are set for the students need to be pitched at the right level. During the interviews, many faculty members talked about helping students to overcome the hurdles in learning by using strategies that reduce the cognitive load involved in instructional activities related to patient care. They frequently used the term “scaffolding” to explain this process:

I do think, in some ways, you need sort of clean learning experiences, like a patient with hypertension, then the patient with hyperlipidemia, then the patient with diabetes, and you do need to know those, and then you put it into one patient, and then you sort of like dig into it. I think you need... It is that idea of scaffolding. – *Faculty member.*

Scaffolding is a teaching strategy that helps students develop conceptual frameworks. It was defined by Dawn et al. (2011) as the “systematic sequencing of prompted content, materials, tasks, and teacher and peer support to optimize independent learning”. The general understanding is that scaffolding enables students to carry out a task which they are not yet ready or trained to complete on their own. Then, as the learner’s abilities increase, the scaffolding provided by the instructor is progressively withdrawn, so students can acquire and solidify disciplinary ways of thinking and acting (Hmelo-Silver, Dunca, & Chinn, 2007).

This strategy was regarded by faculty members as very helpful to guide instruction in simulations, for example. During my fieldwork I observed that scaffolded instruction was frequently employed in teaching clinical skills. In laboratory simulations and cases discussions, for instance, scaffolding was used as a way to allow students to focus on aspects of clinical cases that were relevant to those specific learning goals being targeted in the classroom. Here is how a faculty member explained the process of scaffolding throughout the first three years of the PharmD curriculum:

We start with simple and grow more complex while keeping the bar in the same place. So, they have to keep the patient safe and discuss about the indication, safety, convenience and efficacy of all drug therapy for every patient. That's going to grow more complex based on certain disease conditions and the number of conditions. So, we're growing in complexity as we go. In the second year, we actually have cases that have more than one condition, but in the first year probably just one. And then, as they grow in to their third year (...), they should be able to be responsible for patient care and make appropriate decisions. – *Faculty*.

The final goal, as reflected in the quote above, is to prepare students to be independent and self-regulating learners and problem solvers (Stupans et al., 2010; Dawn et al., 2011). This approach seemed to work well for the majority of faculty and curriculum stakeholders interviewed, but the students were not as confident about the applicability of the scaffolding process in the way it was being used at the College of Pharmacy. Although students acknowledged the importance of tailoring and dosing the cognitive load as they progress in the professional curriculum, they were particularly critical of its use in “simulating professional practice in a sheltered environment”. In their

understanding, the patient-related learning activities performed in class were losing authenticity because they were “too scaffolded”. This issue was the focus of discussion in the focus groups and one of the students presented his idea, which reflects the opinion of many other students:

I feel like the lab activities really follow what they’re saying. Like first year there is a patient that only has cold and allergies or he only has asthma, and that’s not that realistic. But then we get to third year and it’s like this person has heart failure and every comorbidity and who knows what in Outcomes [Pharmacy Outcomes course]. But I don’t know that the step-wise process is that effective because people don’t just have hypertension. That’s crazy. Everyone who has hypertension has something else. And I think you have to learn the baseline stuff, but you also have to realize that that’s not real life. Like how many people in this world just have stage one hypertension? – *Student, focus group*

This student quoted above and many others insisted that patient-related learning exercises lose authenticity when instructors try to isolate too much the skill they are trying to teach or the problem they want students to focus on. The literature suggests that scaffolding is a useful tool to improve students’ thinking skills (Hmelo-Silver, Duncan, Chin, 2007; Stupans et al., 2010; Dawn et al., 2011). However, I argue that it is also important to ponder on what levels of support and guidance are appropriate in order to design learning activities that will likely correspond to authentic learning experiences. It is all about finding the “sweet spot” in the process of supporting students while they acquire new skills, as explained by this curriculum stakeholder:

I'm a big supporter of showing students the fully, messy complexity, but at the same time you also have to make sure that you're not asking them to do something that they are not prepared or able to do. So you can't ask a second year student to function as a practicing pharmacist, and I think if you don't take those things into consideration, you overwhelm students to the point where they're frustrated, they can't have success, and then I think there's disengagement. So you have to challenge them, but not to the point where they're at the point of giving up. (...) There has to be adequate scaffold with whatever you're doing. I think that there are mistakes on either end of that spectrum. You make it so simple that people are disengaged, or you make it so complex that they're disengaged. There is, I think, a sweet spot in the middle there where you need to be challenged, and I think that is motivating, as long as you have confidence you really can succeed. So that's the sweet spot you're looking for.

– *Curriculum stakeholder.*

Disconnections in the classroom: the ugly loose threads

Classroom, practice, and patients: when will they come together?

Focus on patient-centered care is one of the values held by the Doctor of Pharmacy degree program at the University of Minnesota (UMN, 2013). Throughout my fieldwork, I have heard over and over again from students, faculty, and curriculum stakeholders that critical thinking skills are essential when providing optimal care to patients. Students frequently emphasized that the incorporation of patients' needs and desires is a decisive factor in assuring the quality and effectiveness of the care process. But this is not a new idea. In fact, I anticipated these results, since the notion that patients should be put at the center of pharmacy efforts have been under development since 1978

(Cipolle, Strand, & Morley, 2012) and have been reinforced by professional organizations and accreditation bodies in the pharmacy field (AACP 1989; ACPE, 2006).

The intriguing aspect of this finding lies in the affirmation, from the students, that few classes would emphasize the patient as the center of their teaching-learning efforts. In one of the focus groups, part of the discussion evolved around the purpose of pharmacy education and students reinforced that their focus, as pharmacists, should be the well-being of patients. I became curious: Where was that strong sense of duty towards the patient coming from? Here is the discussion that followed my question in that focus group:

STUDENT 1: I think the patient might come from [required course A] and [required course B]

STUDENT 2: I was just going to say that, too.

STUDENT 3: [required course A] and [required course B]. And then there is [required course C], too.

STUDENT 1: Yeah. Otherwise, you don't hear much about the patient.

STUDENT 4: No you don't, you're right.

STUDENT 3: It really is just disease state and drugs.

STUDENT 4: I mean, you do [hear about the patient], but not as much as you think you would.

STUDENT 1: But they [professors] do it right away[teach courses A and B in the first year of the PharmD curriculum], so then you're actually thinking about the patient when they [professors] are talking about therapy and medications and stuff in other classes, but they're not saying it, especially in [required course D], they're not saying it.

STUDENT 5: No. You're learning about structures and methods of action and side effects.

STUDENT 1: But you might be thinking: “how am I going to tell this to a patient?” But they [professors] never have said that in class.

The essence of students’ argument in this focus group was that they don’t see enough connections between the content learned in class and the purpose of their practice as future patient-centered caregivers. According to them, classes that focus on pharmaceutical care process and skills are taught in the first year of the PharmD curriculum and in few other classes scattered throughout the second and third year. However, the content, skills, and abilities learned in those few classes are not always properly leveraged in other courses focused on foundational sciences. As a faculty member said, students “get so bogged down with memorizing all these things, learning all these guidelines, and all these conditions of pharmacology, that they almost start to very much putting people into boxes. Or not even thinking about people, but thinking about drugs and conditions and forgetting about the person part of it.”

It is my belief that while this finding suggest that classes focused on patient care have been highly effective in their purposes, it also unravels a significant opportunity of curricular delivery improvement for the College of Pharmacy. Considering the data I have gathered through observations, interviews and focus groups, I argue that it is important and urgent to strengthen the strategies of curriculum delivery that make the connection between the patient’s life and scientific knowledge more explicit. In fact, the application and reinforcement of curricular content – e.g., basic science faculty providing applications and examples relevant to practice, and practice faculty stressing the scientific basis of pharmacotherapy – is one of the guidelines for the Pharm.D program reinforced by ACPE (ACPE, 2006). I found that some courses were not providing clear

connections of why and how the theory, concept, or content taught related to patient care and it decreased substantially the students' interests on that matter, according to the experience of those ones who participated in this study.

Students voiced not only their dissatisfaction with this disconnection, but also their perspective on how to improve the learning experience in the classroom:

In [required course focused on pharmaceutical technical knowledge] we see this graph of what exactly will happen to the concentrations in the blood if the patient takes the drug. But they [professors] don't bring in what would happen if the patient misses a dose of her medication. I think that would be really good to know. Because until you get to [required course focused on patient care] – where you talk about compliance – you don't bridge that gap, you don't think “oh, the patient might miss a dose once a week, what's that going to do? It's not going to follow the exact chart.” So to bring that into a really science based class might help bridge that gap for me personally, at least. If they could bridge that gap and just reinforce and add in ways that we would use it in patient care, it would make a lot more sense. (...) Because if you can't think of an example of how it applies to patient care, why are we learning it at all? – *Student, focus group.*

“Why do I need to learn it?” This was one of the most prevalent questions I heard from students during my fieldwork. They frequently questioned the usefulness of certain subject matters. In several situations, when I further probed their arguments, their point slightly changed. The issue was not whether that specific content was useful, but how it could be appropriately brought into the students' lives as future practitioners. Similarly, Herreid (2004) reminded us that students often find course content lacking in relevance

because the information delivery model does not reflect situations they will likely encounter in real life once leaving school.

Oja (2011) asserted that improved learning outcomes and critical thinking skills are associated with educational activities that accurately reflect how information can be applied in real-life situations. So then I turned again to the professors who were regarded by the students as successful instructors in critical thinking related to patient care. I wanted to learn from them what they were doing in order to turn the classroom into a space that helped students to become strong critical thinkers. One of them offered this detailed explanation:

If you're in biochemistry or physiology, sometimes there's just a lot of facts. But how can you apply that to patient care, though? That's what I'm always shooting for. If you're sitting there learning about acid-base relationships, that's a lot of facts. When I give you the scenario that you've got a patient who's in full cardiac arrest and the physician is there calling for sodium bicarbonate, I ask: why? Why is that physician caring about that? And you would answer: "Well, it's so you can get the pH back to..." OK, fine. But why? Why do you need to do that? And you would go: "Oh, it's because the patient's heart won't beat adequately in an acidic environment." And then I'd say, OK, now, suddenly, this is a patient that we're trying to care for! But we've got all this biochemistry in the background that we're applying to this patient situation. And if we didn't understand the biochemistry, we wouldn't understand why we're loading certain medications into this patient, trying to save his life. So, for me, if you can tie it back to patient care, that's what sets a pharmacy school or a medical school apart from a biochemistry program or a molecular biology program. It's applied science and the applied part is, for me, the critical part. – *Faculty*.

This faculty's point is that the application of scientific knowledge to concrete and unique patient situations is the defining characteristic of a professional practice informed by critical thinking skills. He insists that questioning, delving below the surface and – most importantly – “connecting the facts with the patient” are the only way to teach “hard science” in a way that sticks with students.

Even though most faculty were focused on making the best out of their time in the classroom, some of them pointed out other factors that impacted the teaching outcomes. Professors of foundational sciences were aware of the students' complaints about the disconnection between basic science and patient-centered practices taught in the classroom. However, some of them added another layer of complexity to this observation. They suggested that didactic teaching and experiential learning might not be connected well enough to achieve its full potential in boosting the student's learning.

I think a lot of students probably sit out there and they complain: “Why are we learning this? I don't need to know this.” But when I'm feeding people this stuff about [disease state], it's not going to take hold until in the fourth year of the program when students are out on clinical rotations. There they will have somebody with a [disease state] and they may review the material. That's when it reinforces what they got in class. – *Faculty*

With this comment, this faculty member argued that the “application portion” of the content taught in his class will only happen when the students are in their fourth year advanced pharmacy practice experience (APPE). According to him, this discontinuity between his lectures and the application of that content was driving the students' apathy regarding that subject matter in the classroom. The ACPE accreditation standard for pharmacy practice experience, in fact, reinforces that colleges and schools of pharmacy

must provide a continuum of pharmacy practice experiences throughout the curriculum, in order to support the achievement of the desired professional competencies (ACPE, 2006). At the University of Minnesota College of Pharmacy, the Experiential Education Program is divided into introductory experiential and advanced practice components (UMN, 2013). The introductory components are completed throughout the students' first three professional years, It aims to enable students to incorporate the information learned in the classroom to their practice. Interviewed faculty members would readily agree that Introductory Pharmacy Practice Experiences (IPPE) are an outstanding opportunity for students to develop basic practice skills. This agreement ended, however, on the question of APPEs and didactic course sequencing. APPEs take place in the fourth year of pharmacy school. Students are placed around the state of Minnesota to complete rotations on hospital, community pharmacy, inpatient and outpatient care settings. Several interviewed professors felt that they would achieve better outcomes in the classroom if APPEs were temporally interfaced with the didactic coursework developed in the classroom.

Though I concede that the disconnection between didactic and experiential learning might represent an obstacle for the achievement of the desired outcomes in the classroom, I don't consider it to be the only reason why students might feel disengaged in the classroom. As I discussed earlier in this chapter, there are teaching strategies that could be put into action in order to overcome this barrier and pave the way for students' active engagement in the classroom. Whereas a closer look into the didactic and experiential education sequencing and timing might be warranted, it is also important to

invest on teaching strategies that can increase students' motivation and perception of relevance on the topics explored.

Teaching what you need to know, assessing what you don't know

Faculty members were emphatic about the fact that they teach in the classroom the essential information students need to know in order to become a successful practitioner. They frequently highlighted that the time in class is not enough to teach students “every single drug in the book”. Thus, they saw themselves as “guides”, providing a starting point for students to further explore the literature on their own. I would expect, then, that the assessment and evaluation of student learning would follow along, focusing on gauging student achievement at defined levels of the professional competencies. However, the circumstances faced by professors in the classroom have led some of them to make considerable changes in these objectives. This excerpt from an interview with a faculty member captures the essence of those changes:

INTERVIEWER: And how do you assess students learning in your class?

FACULTY: Two exams and two quizzes.

INTERVIEWER: And how are the exams?

FACULTY: Multiple choice. It's showing them [students] what they don't know. [pause]

INTERVIEWER: Could you tell me more?

FACULTY: Multiple choice shows them what they don't know. A discussion exam lets them show what they do know, but we don't have time to grade 160 discussion exams.

Time constraints in the classroom – and outside of it – have led some professors to adopt, in some cases, “less than optimal” assessment strategies in order to cope with the high workload originated from their teaching, scholarship, and service duties. Many

professors mentioned that sometimes a “different assessment method” – such as reflective papers, self-assessments, open-ended questions, oral presentations – would be more suitable to measure the achievement of the desired outcomes in classroom. Yet, because of time restrictions and large class sizes, they frequently felt constraint to use standardized tests that were largely based on multiple choices. As sarcastically put by another professor, “reflective papers take a lot more work than just slapping together a multiple guess exam.”

Multiple choice and other objective test questions, which have one definitive answer, are normally used to test students on a wide range of material in a short period of time. They are quick, efficient to administer, cheap, and easy to design, trial, score, and revise (Veloski, Rabinowitz, Robeson, & Young, 1999; Epstein, 2007). However, experts know that multiple choice questions are not the best way to assess higher-order thinking skills (Green & Klug, 1990; Tsui, 1999). The point of concern, in my opinion, is that this type of assessment might not result in meaningful evidence of student learning and it does not evaluate the actual competencies students are supposed to learn in those specific courses.

It is important to highlight that, throughout my fieldwork, I have interviewed and observed professors that would actively seek to to engage students, improve learning retention and measure their results. I was left with the unmistakable impression that there are several individual faculty members very much invested on measuring how successfully their students are learning and using that information to improve the quality of the education they provide. But I have also learned about classes that rely almost

exclusively on objective and structured exams when assessing students' achievement of the desired outcomes in the classroom.

In addition to that, I found that the difficulty of handling discussion exams is not the only factor preventing faculty members from measuring the desired outcomes throughout the PharmD program. Some professors mentioned that critical thinking is a difficult construct to measure and that they do not know ways to do it. As put by one of the curriculum stakeholders, "right now we don't have this kind of clear-cut thread that we assess students on critical thinking throughout the curriculum".

Critical thinking is one of those things that we all know when we see it, but how do you measure it? You know, I don't have a real good answer for that. I do it through some of the papers I have the students write up because I can tell what's going on there. Multiple choice exams, if they're constructed properly, I think we can get at it to some extent there. [pause] Maybe not as much... I don't know. – *Faculty*

So what would it be the 'ideal' assessment method(s) to gauge the development of those higher order thinking skills the curriculum aims for? I decided to invite the students to this discussion. I wanted to know their perspective on the assessment of critical thinking skills in the classroom. Students talked at length about it during the focus groups and interviews and here is how one of them summarized her opinion on the limitations of multiple choice exams:

Multiple choice exams also tend to lead people away from critical thinking because it limits you and it just says: "okay, these are the options". I think they are obviously important because professors have to know whether or

not you know the material. But in terms of when you get out in practice, that style of thinking is not really going to help you, because in the workforce no one is going to say “hey, pharmacist, can I give A, B, or C to the patient?” So there are a lot of things that we do that don’t really support critical thinking. – *Student, focus group.*

Some authors indicate that multiple choice exams are more useful in making accurate judgment of a student's breadth of knowledge because they can cover a broader range of topics and sample a greater range of facts, concepts, and principles (Zeidner, 1987). However, when it comes to reflecting one’s knowledge in the subject matter, the literature suggests that critical thinking skills are more likely to be properly assessed through a mix of subjective and objective exam formats, such as essays and exams with open-ended questions (Tsui, 1999; Veloski, Rabinowitz, Robeson, & Young, 1999).

The fact that essays and reflective papers are considered better tools to assess critical thinking does not mean that they are the students’ favorite classroom exams. Some students admitted that they would prefer multiple choice exams because they perceived them as less difficult and less labor intensive. Others, however, acknowledged that answering open-ended questions would be the best strategy to apply higher order thinking skills and to show what they actually know about the assessed topic.

It [multiple choices exam] is probably easier, because then you have four choices, you know? I mean, I’m not going to lie about that. But when it comes to thinking, okay, what kind of pharmacist are you going to come out? If you want to build critical thinking pharmacists, then I think you have to do open-ended questions. – *Student, interview.*

I think that although written exams can be a little bit more daunting, I would actually prefer to do a written exam over a multiple choice exam, because on a multiple choice exam, you pick the wrong answer and it's wrong, whereas in a written exam, it might not be the perfectly right answer, but if you justify it, you might still be on the right track. And so you can justify yourself and still show that you do know what you're talking about. – *Student, focus group.*

Students were emphatic affirming that multiple choice questions are useful for judging their ability to “regurgitate facts” but they are not particularly good at judging their knowledge on the subject matter. This opinion is corroborated by Tsui (1999). She affirms that exams that require students to construct responses or answers to a question, problem, or challenge rather than merely to memorize and select correct answers from a list of alternatives are more likely to be successful in measuring the examinee's level of knowledge and training.

In addition to assessment methods discussed above, students also mentioned care plans prepared in patient-focused classes as a good assessment method. According to them, a good assessment piece integrates different fields of knowledge and sources of information. According to them, it also ‘mimics’ real world situations, where one question might have more than one right solution.

The ability to think critically can be considered a form of higher-order thinking to the extent that it demands more than simply the ability to recall (Tsui, 1999). Thus, it is important to use multiple strategies to measure both surface-level understanding of the material and higher-level thinking skills developed by the students as a result of their progress in specific courses and in the PharmD program in general. Taras (2002) reminds

us that the search for integrated and innovative strategies in assessment is no longer an option in higher education if we examine the claims that are being made. If the standards and guidelines for the PharmD program claim to help students to take responsibility for their own learning and to support independent and life-long learning (ACPE, 2006), further efforts should be made to reconcile the contradictions and close the gap between teaching strategies and the currently used assessment plans.

On grades and motivation in the classroom

When discussing the summative component of the assessment process, grades were a ‘hot spot’. Since grading seemed to hinder the ultimate learning objectives in formal education in general (Kohn, 1999; Deci, Koestner, and Ryan, 1999; Taras, 2002), I was expecting that pharmacy professors and students would offer some resistance to its use. However, both faculty and learners expressed resignation with the current situation in the educational system.

STUDENT 1: I think we were supposed to look over the guidelines before class, but no one ever actually did, I’m thinking. But for immunizations, we had quizzes before we came in.

STUDENT 2: The most important thing is: people aren’t going to do it unless there’s some reward for doing it.

STUDENT 1: Or some punishment for not doing it.

STUDENT 2: Or punishment for not doing it. So right now professors are like “read the law before you come to class”. Nobody reads the law.

There’s no punishment for not doing it or a reward for doing it. So you have to give us a reward or punishment one way or the other, because that forces you to actually watch out for that –

STUDENT 3: It's sad to say that it is true, but it's a reality. – *Students, focus group*

I would love to not grade, to be honest. If I could get students to engage on the material... I would think they need to get feedback, but if I didn't have to set a rate to that, that would be lovely. But on the flipside, I know that based on learner motivation, there needs to be a grade attached to it. So I personally feel like I have the right balance of enough stuff to hold them accountable for, but without being completely punitive and penalizing. You wish students would do it because it's good for them, but the reality is, if you don't have something holding them accountable, they'll fall below with their [foundational science course] and all the other stuff that's way more intense and point based. – *Faculty*.

'Grades motivate' – professors, students, and curriculum stakeholders would certainly agree with this statement. Smith (2000) and Curtis (2004) also suggested that grading can incentivize students to strive for excellence, because the reporting mechanism gives them the opportunity to have their performances recognized and rewarded.

However, the trouble with this idea, according to Ryan and Deci (2000), lies in the implicit assumption that 'motivation' means the same thing for different people. People have not only different amounts, but also different kinds of motivation. According to them, there is a critical and qualitative difference between intrinsic motivation and extrinsic motivation - between doing something because it is inherently interesting or enjoyable and doing something because it is a means to an end, the end being to avoid a

punishment or to receive a reward. Not only are these two orientations distinct, but they are also often inversely related (Kohn, 1994; Ryan & Deci, 2000).

Students talked at length about grades as rewards or punishments associated with their efforts in a coursework. In fact, Forsyth (2002) affirms that letter grades represent a massive extrinsic reward and, as such, it is more likely to undermine the sense of personal commitment to the learning process. There is a wealth of studies demonstrating that extrinsic motivators frequently undermine intrinsic motivation (Pilcher, 1994; Covington & Mueller, 2001; Rohe et al., 2006). Therefore, by encouraging the use of extrinsic motivators, the current pharmacy educational system is undermining its own goals of preparing pharmacists committed to the passion for continuous learning.

Deci, Koestner, and Ryan (1999), in a careful consideration of reward effects reported in 128 studies, concluded that tangible reward – such as school grades – tend to have a substantially negative effect on intrinsic motivation. In other words, the more people are rewarded, the more they come to lose interest in what has to be done in order to get the reward. Moreover, strict grade policies may create a competitive and stressful climate that is counterproductive for everyone in the classroom, to the extent that it might discourage a free exchange of ideas and a sense of cohesiveness and community that is conducive to exploration and critical thinking (Kohn, 1994; Rohe et al., 2006).

Another problem the students brought up was that some assessment strategies used to measure achievement of educational outcomes relied heavily on rote memorization. This finding was corroborated by my observations in some classes, where I would frequently hear the professor saying “You guys should memorize it” or “I don’t

want you guys to memorize it”, referring to some specific information being taught. I further explored this observation in my interviews with faculty members. I wanted to know why they were constantly reminding students of what was supposed to be memorized. “They [students] need to be prepared for the exam”, one of them answered. And she further justified it saying that, by informing students “what they need to know” in class, she was actually contributing to reduce their level of stress in getting ready for the exams. Even though her action was well intentioned, her attitude – and the attitude of several other professors – went against the evidence in the literature which suggests that, in order to foster critical thinking, students should be taught how to think and not what to think (Mangena & Chabeli, 2005).

I asked students during the interviews and focus groups to describe a situation in the classroom where they felt their ability to think critically was hindered. Most participants mentioned situations involving memorization and recitation of factual information. This student reported an episode:

I think of [required course]. That’s just where you go into class and it’s a regular lecture, just like any other one where there’s a PowerPoint presentation. The professor will say, for example: “this is osteoarthritis. The first line treatment is Acetaminophen. If that doesn’t work, you might do the NSAIDs. You can consider disease modifying agents, too, like Methotrexate or something like that”, and it goes on. But then you’ll get a case in the exam and they [professors] will say: “this person has osteoarthritis, what do you do?” Well, the first thing I would do is Acetaminophen, then I would consider NSAIDs. I mean, you’re told the answers! – *Student, Focus group.*

One of the problems with those strategies is that memorization does not directly equate to learning (Ludmerer, 1985) and it also does not equate to critical thinking (Facione, 1990). Using a student's words,

“it is one skill to memorize and learn information and another skill set entirely different to be able to apply and utilize that information in a real life setting. I also think it is possible for a person to be great at memorization (i.e. be "book smart") but not skilled at critical thinking and vice versa. – *Student, written interview.*

In fact, experts argue that the memorization of factual information not only differs from critical thinking, but it can be actually a hindering factor to its development (Facione, 1990; Paul & Elder, 2002). Students were not sure if grades obtained in these 'less than optimal' assessment methods were a clear indication of their knowledge and level of training.

From the participants' perspective, the resignation with the grading system did not come without a sense of bitterness and uneasiness. The system has been around for so long that professors and students believe in grade as an essential constituent of the educational process and not as a construct of a system that arbitrarily classify 'achievement' with a 5-level, A through F scores. For those who dared to dream of another system, their ideas came almost with a nostalgic tone, as expressed by this professor in one of the interviews:

I really would love to have a course where it would be pass/fail. Because either it is good enough for patient care or it is not—for my opinion—and I feel that way about my fourth year rotation students. I think it should be pass/fail with a lot of feedback because the numbers aren't important. It is the feedback and

whether they take it, reflect upon it, and use it and improve. I mean, the words—it is like any time I am evaluated, the numbers don't really mean much beyond a certain sort of pass/fail point. A zero would be bad, probably, and a five would be really good, but anything between a three and five is okay. But what matters to me is the actual feedback, the actual words, the actual things that I can take and use. So that is how I wish I could evaluate students.

– *Faculty.*

As highlighted by Bruner (1961), there is nothing wrong with helping students to internalize and work towards meeting high standards, but that is most likely to happen when they “experience success and failure not as reward and punishment, but as information” (p. 26). The last decade witnessed the emergence of a new and significantly refocused paradigm for training healthcare professionals, but it has not been accompanied by a new paradigm for assessment (Smith, 2000). The discussions about other forms of performance assessment are yet to take place before we can move forward with the objective of creating professional curriculums where knowledge and competencies are emphasized without losing sight of flexibility in thought and action (Diwakar, 2002).

The Environment: Hindering and Fostering factors

Class size and the ambiance

Under the motto “one college, two campuses” The University of Minnesota College of Pharmacy offers the PharmD program on two campuses across the state of Minnesota (UMN, 2013). One campus is located in Minneapolis – the Twin Cities campus – and the

other one in Duluth. Faculty and staff are shared between the two campuses, but they work under the same curriculum.

The fact that these two campuses share the same curriculum added some peculiarities to the curriculum delivery process at the College of Pharmacy. While students in both campuses may benefit from the expertise of their peers and professors from another campus, many participants also highlighted several cumbersome specifics attached to this situation. My study included participants from both campuses and the differences between them regarding their views about critical thinking were not significant. Participants from both campuses shared similar experiences in defining critical thinking and discussing the best approaches to teach it in the classroom. However, when the subject turned to the environmental issues associated with pedagogical practices in the classroom, the differences between campuses became remarkable, as stated by this faculty member:

I think a lot of it is environmental. I should have, but I maybe didn't appreciate the environment's impact on teaching. The space, how the room is set up makes a difference in how you facilitate. There is a volume issue. This year I had 116 students in Twin Cities and I had 55 in Duluth. So that number alone is just very different. It's a lot more people to try and keep engaged on the Twin Cities campus. – *Faculty*.

Class size was another issue extensively discussed by faculty, students, and curriculum stakeholders. They were all in agreement that large class sizes hinder the learning process. The excerpt presented in the Appendix IV - Collaborative Analysis Excerpt A (see Appendix IV) speaks to this issue and represents the opinions of several

students that participated in one of the focus groups. The focus group had a rich and thoughtful exchange of opinions between the students and I decided to share an excerpt from it with a peer analyst collaborator in order to gain another perspective on that data.

After independently analyzing the excerpt, our perspectives were similar in many points. By reading the excerpt, the collaborator noticed that students were expressing a predilection for smaller class sizes. In fact, I came to the same conclusion by analyzing the data collected not only in that focus group, but throughout the entire research process. Finn, Pannozzo, and Achilles (2003) reviewed the literature on the influence of class size on student behavior and engagement and they also concluded that small classes boost academic performance. There is a wealth of evidence available about the benefits of small group discussions and small class settings to the students' academic achievement and critical thinking development (Gokhale, 1995; Finn, Pannozzo, & Achilles, 2003; Oderda et al., 2011). The peer analyst collaborator was puzzled by the current paradox between the evidence in the literature and the current situation at the College of Pharmacy. He wrote:

A preference for small class size is nothing new, of course. And it makes me wonder why the CoP [University of Minnesota College of Pharmacy] doesn't work harder to create smaller learning groups, considering the obvious educational benefits and apparent student preference for this instructional method. If I were a student, paying our tuition, I would expect smaller, more intimate learning experiences. I think it's a shame that our primary instructional methods are so horribly outdated and relatively ineffective. – *Peer analyst collaborator.*

Students have the opportunity to work in smaller groups in laboratory skills classes and also in some elective courses, as mentioned by them in the excerpt reported in the Appendix IV. However, most of the required didactic courses are handled with the entire class together. The class size each year is around 167 students, with about 60 students at the Duluth campus and 107 at the Twin Cities campus (UMN, 2012). Given that some of those courses haven't been much successful – according to the findings of this study – in incorporating other teaching strategies that involve active learning and small group discussion, I suggest that these results represent a significant opportunity for improvement for the College of Pharmacy. Whenever possible, smaller class settings and more opportunities to work in teams or small groups should be actively sought by faculty involved in those classes in order to enhance learning and foster critical thinking skills.

The experience of faculty members in the classroom corroborates this recommendation. In their perspective, “it is nearly impossible to keep 160 students engaged all the time”. Many professors reported feeling in charge of keeping students motivated in the classroom and this task becomes a burden when classes are so large. This faculty member uses an interesting analogy to explain her genuine concern about the students' learning needs:

I view my students as patients, kind of. I think it goes back to the relationship. You need to have a relationship with your patient. You need to have a relationship with your learner and understand their needs to help meet them and I think it is really very challenging in a class of 165 students to do that. – *Faculty*.

Other professors mentioned that it was very difficult to memorize the students' names and it hindered their ability to interact with students in a more conversational way

in the classroom. The students resented it and they also agreed that large classes decreased their possibilities to interact with professors:

The fact that our class size is so large makes critical thinking in the classroom difficult. Each one of us is just a number in that setting and there is minimal back-and-forth between student and professor to build a relationship that aids in critical thinking. Because we don't get live feedback, our learning is delayed. – *Student, written interview.*

According to the participants' experience, large class sizes also had a negative impact on their choice of teaching strategies. Many faculty members in the Twin Cities campus affirmed that they would like to use case studies and small group discussions more frequently, but they felt discouraged by the challenges posed by involving more than 100 students in this task in the same classroom. Those who dared to face this challenge acknowledge that the lack of human resources in the classroom complicates even more the situation:

When they are working in groups, we try to circulate and listen to what they are saying and interject and say 'well what about this?', but unfortunately we don't have the, the person power, there's not enough of us. To get around to 27 groups in a classroom, in a discussion period, and to be there at the right time when those questions come up is not easy.

– Faculty member.

It is important to mention that there were 1-3 teaching assistants in each class I observed, but they were generally in charge of grading papers, care plans, quizzes and exams. They would prepare copies of materials for specific class periods, but they would not necessarily participate directly in classroom activities.

Large class size also had a negative impact on the assessment methods used in the classroom, as I already discussed previously. Although reflective papers were regarded – by faculty and students – as an excellent tool to foster critical thinking in the classroom, faculty members questioned the volume of work and their ability to give proper feedback to the students: “How many times can you do 160 of those in a semester, and you are staying fresh yourself to be able to give good feedback?” one of them wisely wondered.

Although professors felt highly responsible for the students’ engagement in the classroom, the peer analyst collaborator brought another perspective to this analysis. After having access to the excerpt presented in the Appendix I, he brought to my attention the issue of students’ passivity in the classroom:

Expectations seem to drive some behaviors. Several students noted an “expectation” to participate when the group is smaller. In a larger group, the expectation to contribute to the discussion is reduced. But my question is if the students know that discussion is a good thing (and it appears they do), why don’t they put that expectation on themselves? Why do they wait for an external motivator to drive their own learning? This seems to be a trend in education: to get by with as little resistance as possible. I believe this trend is driven by many factors, including the high cost of education, and the fact that most of these students spent their entire k-12 education in the “No Child Left Behind” system, which promotes more rote memorization and regurgitation, as opposed to a critical understanding of issues. But the fact remains, these students will be professionals, and they will soon be responsible for their own education. If we’re not teaching them how to LEARN, how to THINK, how to be COLLABORATIVE, and how to COMMUNICATE, we are not giving them the tools they need to succeed in the long run. – peer analyst collaborator.

His observations on the students' decreased sense of accountability in large classrooms struck me as accurate and legitimate. Even though they resonated with my observations in the classroom and informal conversations with students, I have not framed a solid discussion on that topic up to that point. So I went back to the fieldnotes, interviews, and focus groups' transcripts in the search for more evidence that could support or refute his argument. In fact, several students and professors mentioned the students' passivity in the classroom as a point of concern. There was one discussion in particular with a professor that caught my attention. He was very emphatic in his point that students that arrive at the university were already "trained to be passive" in their academic life. Our conversation went as follows:

INTERVIEWER: If you would have to name any practice in the classroom that hinders critical thinking ability in the way students are taught today, what would you tell me?

RESPONDENT: Training—we are not training them [students]. They come this way. They come to us like this— we're allowing our students to remain passive in their learning.

INTERVIEWER: What do you mean by that?

RESPONDENT: They are very comfortable in sitting there in a chair taking notes like you are doing right now. They are very comfortable with that. They want that. And a few don't, but almost all do. (...) I have an active learning exercise that I have been doing in a class which is 'peer teaching', something I have been involved in from the beginning, since we started this course. And the students are okay with it. Rarely do we get a "Wow, this is really a great way to learn!" But what you do get, a certain percentage of the students say is, "I am really unhappy about this. I paid good money and I am teaching myself? I am teaching students? This is

crap!” And they mean it. They are really resistant to that. They want you just to tell them and they want to be very quiet and just have a few people ask questions. They are very comfortable. – *Faculty*.

Passivity is a familiar learning environment to American students, according to Brown (1992). He affirms that both students and teachers are used to the pedagogical assumption that the formers are passive receivers of wisdom delivered by the teacher. However, Niemi (2002) helps us to delve deeper in this subject when she stresses the social elements of learning. She explains that active learning theories presuppose cooperative action and partnership among teachers and learners, based on mutual respect. In this sense, the responsibility for nurturing and furthering a supportive atmosphere for the learners’ engagement and participation should be a shared endeavor. It is my belief that, due to power imbalances in the classroom, professors should be hold accountable for creating a more democratic learning space in the classroom. On the other side, students should not evade their share in the communal effort to make active learning a reality in the classroom. They ought not to be treated as vessels to be filled with knowledge, as Paulo Freire (1970) reminded us, but they should also avoid behaving as such, as suggested by my peer analyst collaborator.

Another interesting theme pervading the excerpt presented in the Appendix IV and many other interviews is the students’ distress when they felt required to speak up in large classrooms. Many of them referred to that situation as “nerve wracking” and they mentioned feeling embarrassed and stressed out when they were “put on spot” in the classroom. Those feelings are not conducive to a healthy learning environment. Caldwell (2007) mentioned that students in large classes are often hesitant or unwilling to speak up

because of fear of public mistakes or embarrassment, fear of peer disapproval, and pre-existing expectations – on the part of both lecturer and students – of passive behavior in a lecture course. The peer analyst collaborator added to the discussion:

I noticed that students are afraid of being “wrong.” Nobody wants to look stupid. I think we all understand that sentiment. At the same time, I wish these students would realize that this is the place to make mistakes, and be wrong. We learn most thoroughly when we make mistakes and fail. So I hope these students fail as much as possible, because failure is a powerful instructor. We (people) continually adjust our lens on life when we work with other people, gain new perspectives, and articulate new ideas. Why we don’t teach in this way is a mystery to me. – *Peer analyst collaborator.*

I’m in agreement with the peer analyst collaborator. Although it is frustrating that students feel this way about the environment that was supposed to be a safer learning space, I believe that this situation is the reflex of the schooling process endured by them. The ideas discussed in the sub-section “On grades and motivation in the classroom” reinforced my belief that the current pedagogical practices in higher education might have negative effects on students’ mental and emotional health, not to mention the hindrance of collaboration and sharing in the classroom.

Space and technology issues

Meyers (1986) reminded us that the classroom space should be designed to facilitate the activity of critical thinking. In 1986, he wrote:

We may be on the verge of the twenty-first century, but step into almost any college classroom and you step back in time at least a hundred years. Desks are normally in straight rows, so students can clearly see the teacher

but not all their peers. The assumption behind such an arrangement is obvious: Everything of importance comes from the teacher. (Meyers, 1986, p. 64)

My observations, made more than 25 years later, still show the same reality in the classroom: rows of seats organized facing the front of the classroom, where usually the professor stands during his or her lectures. I observed some classes that took place in auditoriums, with seats bolted to the floor and organized in levels facing a raised lectern. Faculty members reported several difficulties in working in such space, highlighting that it hampered the work in groups, since it was difficult to get the students physically close to discuss and hear each other. Mangena and Chabeli (2005) supported this perspective by affirming that critical thinking is not likely to be fostered when the seating arrangements in the classroom do not facilitate dialectic and dialogic interaction.

During my observations, I also had the opportunity to learn about the perils and promises of some technology resources applied to teaching and learning. The University of Minnesota College of Pharmacy uses interactive television (ITV) technology to keep both campuses connected during specific courses. Some classes are delivered synchronously from the Twin Cities campus to Duluth and others from Duluth campus to the Twin Cities. Even though this technology represents a great advantage in terms of expanding educational experiences and delivering the same curriculum to two campuses at the same time, there were some bothersome issues that frequently impaired the class flow.

The first one was the channels of communication between the two campuses. Although the classes in the Twin Cities campus were equipped with several monitors that

would transmit simultaneously the image of Duluth students, the sound system did not work as well as the image transmission. Notwithstanding the frequent sound interferences, the microphones in the ITV room were positioned from the ceiling and they were unable to discriminate between different types of noise (e.g., voices versus other table noises such as paper scrunching, pencil tapping, etc.). All noises were amplified and transmitted, what would render unfeasible the simultaneous transmission of classes from one campus to the other. The solution found was to mute the ceiling microphones in both campuses. In order to keep the communication going, then, the Twin Cities campus used wireless microphones, which means that pharmacy students in the Twin Cities would only be heard by their counterparts in Duluth if they would use a microphone each time they spoke. In some classes, the lecturer in the Twin Cities would not provide the wireless microphone to the students. Instead, he would hear the question and repeat it in his microphone for Duluth students. From Duluth, the alternative was to turn on the microphone each time students would have a question.

It is not surprising that students found this process frustrating and troublesome. In the focus groups and interviews conducted with Duluth students, they admitted to rely more on recorded lectures and to not be frequently in class to hear ITV transmitted lectures because they found the whole process very unsatisfying:

What makes it [low class interactivity] even worse is ITV. If you have a teacher that, you know, they can't hear you when you ask a question anyway. So what's the point? You're just going to distract everyone by asking a question, because you have to scream it out three times and then get the microphone and then ask the question. Like I'm just going to leave

it, watch it later, and if I have questions, I'll ask my classmates. – *Student, focus group, Duluth.*

My observations from the Twin Cities campus support their view that the interaction between campuses was impaired. I found that several faculty members would constantly try to engage students from the remote campus, but a number of them seemed to do not be comfortable with the interactive setting, as I described in this excerpt from my fieldnotes:

The class starts sharply at [suppressed to protect confidentiality]. Today I'm sitting in a row before the last one, on the left side of the room. The attendance is somewhat low, with about 40% of the students in class in the Twin Cities. I see few students in the screen, what makes me think that the attendance in Duluth is even lower. I turn to a student by my side and ask "where is everyone?" to which he responds: big [foundational science course] exam tomorrow, you know..." The professor starts the lecture and the microphone from Duluth is muted, as usual. The lecture goes on in a fast pace, with students following along the slides projected on the screen and asking few questions in the Twin Cities without using a microphone. (...) The professor doesn't seem familiar with ITV technology, because she keeps teaching as if she only has the Twin Cities students in this session. She does not interact with Duluth students and she does not repeat the questions in her microphone to Duluth students. By the third question, one student sat in the front row in the Twin Cities raised her hand and asked the lecturer to repeat the question on the microphone, so students in Duluth could follow along. The lecturer apologized, repeated the question and kept going. – *Fieldnotes, March 2012, Twin Cities campus.*

Berry (2009) asserts that an ambiance conducive to interaction among students is a prerequisite for critical thinking enhancement in the classroom. I also argue that the interaction with the instructor is equally important. Besides the hurdles in communication imposed by the ITV problems, I observed that the professor usually had to be in a specific point – generally in front of the classroom, behind the lectern – in order to have his image captured in video from the remote campus. I see several points of concern associate to this fact. The first one is that the tone set by the professor standing in a fixed point in front of the classroom accentuates even more the sense of power imbalance in that space. In my opinion, it sets a tone of room divide, where the professor must be the one “delivering the knowledge”, since he is the only one with the microphone. Her position of privilege is accentuated rather than smoothed out in this setting.

Another problematic finding associated with this situation, in my perspective, is that the teacher’s limited mobility in the classroom makes it even harder to stimulate students’ engagement in the classroom, especially in the Twin Cities campus, where the rooms are large and filled with more than a hundred students. Professors could not meander around and engage students in conversation during lectures or other class activities. Although it isn’t a rule, this specific aspect of the classroom environment might be a limiting factor in making the classroom an inviting space for active learning.

Professors involved in classes that were taught simultaneously – through interactive television (ITV) technology – to both campuses corroborated my point and added another issue to the aforementioned difficulties in keeping students engaged during

classes. This faculty member spoke about his struggles to read non-verbal communication clues when all he sees from Duluth is a screen with little indiscernible faces:

One of the big issues, of course, has been Duluth. It's very different when you teach through ITV because when I'm lecturing in front of a group, I like to throw out questions trying to get them to participate. I can do that with the Minneapolis students. I can't do that with the Duluth students. Like when we teach something like [basic science content], which is a bit more complicated, you can always look into their eyes and get a feel if they are getting the content or if I we need to back the wagon up a little bit. I can see the people in Duluth, but I can't see them close enough to I understand whether or not they're getting the material, unless they stop and ask questions. – *Faculty, Twin Cities campus.*

Another point emphatically made by some faculty was that, for some specific classes delivered from the Twin Cities campus to Duluth campus through ITV, there wasn't an instructor in charge in Duluth campus to coordinate the discussion in the classroom. They felt it was very detrimental to the quality of the instruction provided by them.

It's difficult for [content taught by this professor]. Since we do things by ITV, I would love to do more case discussions. But it's difficult in [content taught by this professor] because there's not a content person in Duluth who could lead discussion up there. While I can lecture ITV, we cannot really, effectively do active learning that way. It's not going to work, in my opinion. – *Faculty, Twin Cities campus.*

A number of professors highlighted their frustration with this situation. Some of them said they would voluntarily make the effort to go to Duluth and teach some classes from there. In that situation, those ones who would go would either leave the class

uncovered in the Twin Cities end or they would involve a pharmacy resident to lead the class there. This situation was very upsetting to some professors. I consider it to be very problematic from the instructional point of view, especially bearing in mind that several classes taught in this situation are considered to be core disciplines in pharmacy education. Notwithstanding the issues with technology in the classroom, these findings suggest that the supply and management of human resources at the University of Minnesota College of Pharmacy also deserve careful reexamination.

The findings presented in this section suggest that technology and physical space impact the outcomes of curriculum delivery regarding critical thinking skills. There is plenty of information in the current body of literature regarding those issues, but it seems necessary to delve deeper in the quest of quality in higher education in the times of economic hurdles. When it comes to classroom sizes, human resources and infrastructure offered by universities, the answers of what is suitable aren't available yet, at least for pharmacy education. Students and professors' educational experiences with issues related to the classroom environment should be kept in mind as pharmacy educators and curriculum stakeholders prepare the curricula and consider how best incorporate the emergent technologies into instructional strategies to foster critical thinking in the classroom.

Thinking Critically of What Matters in Pharmacy

Education: The Forbidden Topics

Martin (1998) argues that academia is a system of power that resists and accommodates other power structures from the society. According to him, hierarchy, disciplines, and professions are a few examples, amongst many, of power structures that interact and shape the knowledge that is ultimately legitimated by academics. In this sense, it is essential that higher education institutions constantly and intentionally address these issues in order to strengthen and broaden the positive features of academia that might lead to a more democratic and equitable society, while overcoming the negative features that might represent a hurdle in this process.

During the course of this research, I quickly realized that there were some sensitive subjects that most of the participants did not feel comfortable talking about. Every time that the conversation bumped into controversial issues – such as gender, race, or ethnicity – or power struggles inside the curriculum, faculty members and curriculum stakeholders would tend to run away from the topic. I decided to call these issues “the forbidden topics” because they were rarely mentioned by the participants in this study, despite their contextual importance to critical thinking performance in healthcare scenario. The following discussion is mainly based on three interviews with faculty members that decided to fight the discomfort and speak openly about issues that populate their practice as pharmacy educators.

Power Struggles in Academia

When talking about critical thinking with curriculum stakeholders and faculty members, I was curious to learn how they decided what should be taught in the classroom in order to prepare a pharmacist for practice. My curiosity was based on two observations: first, many professors would describe themselves as “filters of information” for the students, arguing that it was not possible to teach all the information available in their specific areas of expertise. Secondly, I was interested in learning how the changes in the focus and purpose of pharmacy profession – including the relatively new focus on critical thinking skills – have influenced the type of content taught and the delivery strategies adopted in the classroom. This curriculum stakeholder offered her perspective, affirming that there are some contents that must be taught during pharmacy education:

Are you going to be calculating these things the rest of your life? No. However, if you don't learn it back then... Have I ever used a differential equation after I learned it? No. Twenty-five years of practice, I've never had to use a differential equation. I probably couldn't even do it anymore, but I remember learning it. So there are some things you have to learn.

– *Curriculum stakeholder.*

Her opinion that “there are some things students have to learn” resonates with the overall idea pervading the discourse of many other faculty members. Indeed, the ACPE sets a consistent, clear understanding of what pharmacy students are expected to learn (ACPE, 2006). The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills pharmacists need for making significant contributions to the current healthcare field. However, it still did not answer my question of how faculty decided what to teach and what to leave out. Also, I was intrigued by the

idea that some subject matters should be taught regardless of its applicability in practice. By reflecting on that, I did not intend to question the relevance of a given content, but I was rather puzzled by the complications that might derive from the disconnection between what is taught in the classroom and how pharmacy practice is set up in the real world.

I gained a better understanding of this issue after interviewing a faculty member that spoke extensively about the changes in pharmacy curriculum over time. Being a professor for more than 30 years, he spoke of his experiences with those changes, including his perceptions of changes on student learning outcomes throughout the time he has been a professor (see Appendix V). He sounded skeptical about the direction taken by the profession – and consequently by the curriculum – in the past years. His overarching point was that changes occurred over time in pharmacy curriculum culminated in students less prepared to handle and produce scientific knowledge.

Although he expressed genuine concern about the students' preparedness to pharmacy practice, I wondered if his point about the struggles between disciplines of knowledge inside pharmacy curriculum could also be related to a territorial protection of power and status in that realm. The "good balance among disciplines" could actually be a representation for the relatively higher status of the subject matter taught by that professor in the past compared to the current situation.

I found his perspective to be very intriguing and I decided to share an excerpt of his interview (see Appendix V) with a peer analyst collaborator. The points made by the peer

analyst collaborator were aligned with my reflections. The peer analyst collaborator wrote:

Having not been around during the 90's nor being able to see what has gone on behind the scenes, it's difficult for me to refute the observations of the faculty member, although my inclination is to do exactly that. I agree with the faculty, from my perspective as a student, that the medicinal chemistry professors resist significant change because it either fundamentally alters what and how they teach, or for some, if they teach at all. Maybe the "balance" he talked about inadvertently worked in the past but I don't think it is a solid, well planned foundation for building a good pharmacist. It seems to me that this approach begins with the professors as the starting point and builds a curriculum where each of them fit. I believe a curriculum that begins with the end in mind (what do students need to MASTER prior to P4 year and beyond in order to meet basic requirements) would provide students with access for further growth.

– Peer analyst collaborator.

The idea that professors – and disciplines of knowledge – are the starting point of the curriculum is congruent with the concept of teacher-centered curriculum, as suggested by Pinnegar and Erickson (2010). This philosophical approach to education entails curriculum-centered classrooms where the focus is essentially to teach the curriculum in a one-way information transfer. The teacher determines what ought to be taught, when, how, and in what time frame. One of the problems with the didactic information processing endorsed by this approach is that it does not address the diversity of students' learning styles and the increasing complexity of learning environments and strategies currently available in higher education.

Educators agree that learner-centered approaches are more appealing to critical thinking development, besides producing better overall educational outcomes in terms of students' motivation to lifelong learning and independent thinking (Felder & Brent, 1996; Dam & Volman, 2004). Even though the ACPE (2006) has provided a solid description of the standards and guidelines for the professional program leading to the PharmD degree, it has failed to address philosophical issues regarding the pedagogical approaches to be adopted by colleges and schools of pharmacy while preparing the next generation of pharmacists.

Philosophy drives behaviors and, therefore, I argue that greater advancement could be made in the pharmacy education field if the accreditations bodies would ensure that colleges and schools of pharmacy adopt learner-centered classrooms. It is my belief that pharmacy is more likely to achieve its educational goals by focusing on individual students' learning and relying on professors as facilitators who stimulate students' growth by utilizing the interest and unique needs of students as a guide for meaningful instruction.

Another concern voiced by the participants of this study centered on academic freedom and the professor's sovereignty in the classroom. According to the American Association for University Professors (AAUP, 1940), academic freedom involves freedom of research, publication, and classroom discussion of the content related to their area of expertise. However, several professors mentioned that some of their peers seemed to resist the trends towards more innovative teaching strategies in the classroom under the excuse of being protected by the principles of academic freedom:

“Overlying all of this [resistance to change] is academic freedom. Under the guise of academic freedom, faculty believe that they can teach anything, any way they want to, in their course”. – *Faculty*

In fact, the Statement of Principles on Academic Freedom and Tenure (AAUP, 1940) declared that “teachers are entitled to freedom in the classroom in discussing their subject” (p.3). However, Lightner & Benander (2010) affirm that some faculty members might generalize this freedom to mean that there should be no limitations on what professors do in their classroom. However, those authors argued, this generalization is a misinterpretation of academic freedom. I interviewed another faculty member that talked extensively about this misinterpretation. When I asked him what could be done to foster critical thinking in the classroom, he shared some of his experiences working in the curriculum revision committee at the College of Pharmacy. This committee was in charge to formulating a series of recommendations for discussion and faculty approval for a revised, integrated curriculum beginning in the Fall semester of 2013. The professor said:

We need to teach the teachers, which is possible. But the danger is two folded. They either aren't capable of doing it because they were mostly assigned based on content expertise, not on their teaching abilities; or they are not willing to engage in something different. And so, therefore, when they are assigned, most people have a good attitude that they would like to be playing ball with everybody else. But there is this issue of academic freedom in our country—at least in our educational model—such that we have been told already, quite forcefully by certain faculty, that “You can't tell me how to teach.” Those very words: “you cannot tell me how to teach. I will teach the way I teach!” And some of them say: “I have got 30 years of teaching experience. I am experienced.” And I go: True you are. Exactly! And they go: “I am not interested in this active learning s***. I

am just going to teach the way I want to teach.” And I go: Okay! I mean, you can’t really argue with that necessarily because if there is a given content that the students need to learn, it is up to faculty to figure out how they are going to get those students up to speed. Now, if they have an outcome that they don’t meet, well... Then that is a problem! But if their outcome is knowledge based, only understanding... If that is what they are being held to, then they can do it however they want. – *Faculty*.

Lane (2007) agreed with this faculty when she affirmed that higher education faculty usually feel that their students and events in their classrooms are their own business. She reinforced that faculty can fall back on the principles of academic freedom to resist change in teaching practices. The solution to this impasse, as suggested by the faculty member quoted above, lies on the clear identification and effective assessment of student learning outcomes. The specification of classroom practices is surely to the discretion of instructors, but being asked to specify and assure student learning outcomes for a course in no way inhibits what the instructor teaches. Furthermore, the contemporary demands in the healthcare field require that the next generation of professionals is able to not only understand, but also to apply higher order cognitive skills, such as analysis, evaluation, inference, explanation and self-evaluation (Bloom, 1956; Facione, 1990). The identification of student learning outcomes involving those critical thinking skills could help create a framework for coherent, integrated course designs that are more consistent with the current goals of pharmacy education.

Does Race Matter?

There is no doubt that, in order to strengthen a democratically engaged society, educational institutions need to apply innovative instructional practices to promote respectful, transformative dialogue on controversial topics and complex social issues.

Race, with its shifting meanings and culturally determined parameters, has always shaped medical practice and thinking (Braun et al., 2007). Experts recommend that organizations openly acknowledge this issue and create safer spaces for honest discourse about race-related experiences in daily practices (Nunes-Smith et al., 2008). In the educational field, Caldwell (2012) argued that this exchange of ideas in a respectful environment leads to the establishment of learning communities in which critical thinking naturally emerges.

Even though my observations in the classroom would contain some race-related content – such as cases and examples of clinical situations where race would play an important role – race was hardly ever brought up by the participants in this research. I suspected that it could be due to the fact that I am a black woman and the majority of the faculty members interviewed were white, since Snipes et al. (2011) suggested that white people experience greater discomfort than minorities when discussing issues of race and ethnicity. It was with a joking tone that this faculty member opened the conversation about race in one of our interviews:

INTERVIEWER: This the first time that race came up in the entire research. I think it is a really important factor, but it seems that people don't feel comfortable talking about it.

RESPONDENT: No, because [says in a mock warily tone] we don't want to because we're in Minnesota, and if we just don't talk about it then it is not a problem! – *Faculty*

This faculty member was one of the few participants that brought up race-related issues during the research period. Apart the joke, she acknowledged to struggle with interracial relationships in the classroom being herself a white woman. She also shared some practical difficulties involved in including race-related issues in teaching strategies commonly used in the classroom. She explained:

I went to the AACP Institute last summer, and it was all about teaching cultural competency. If you read what they recommend in terms of how you're supposed to do case presentations... Race is not supposed to be in a case presentation unless it directly pertains to the pathophysiology of the disease or the drug therapy you pick. So I shouldn't present... [pause]. Essentially, I shouldn't present anybody as an African-American male. It shouldn't happen in practice. So, then, there is a difference between the cases you write for education versus how things are... It makes my head hurt! And so, how does race fit in? I have maybe overreacted. I've reacted out! I mean, I've really struggled with these concepts because, from what I've read on cultural competency, you want to avoid stereotyping, but then, how do you do on a paper case? How do you make it a person, and avoid that stereotype? [pause]. You don't want to necessarily make all of your patients black, unemployed, and on crack. You know, that is not cool either. So how do you balance and make sure that you have a diverse patient population? I've just found myself thinking about that, too.

– *Faculty*

The role of patient's race and ethnicity in the treatment decision-making has been heavily debated (Braun et al., 2007; Nunes-Smith et al., 2008; Snipes et al., 2011). According to Braun et al. (2007), both historical evidence and contemporary genetic research suggest that “racial profiling” in medicine can lead to serious medical errors. Race is, indeed, a social characteristic of populations and I agree that it is inappropriate to

use it as a central diagnostic tool for an individual patient. However, Snipes et al. (2011) made an important point by affirming that patient social attributes ought to be taken into consideration by healthcare professionals in their clinical decision making.

But the question of how to avoid stereotypes remains strong and valid. In order to address that question properly, Braun et al. (2007) reminded us that race should not be taken as a short cut while interviewing the patient. According to them, there is no substitute of an inquiry into family history, an assessment of current circumstances and knowledge about the cultural practices and historical events that might be associated with specific populations. As explained by another faculty member, “the key to do not stereotype is to ask questions”. Students should practice these skills in the classroom and it is my opinion that they would sharpen their clinical skills by improving their knowledge about race and its implications in the healthcare field. Patients of different races and ethnic backgrounds are a reality in the healthcare system. When they are acknowledged and included in the conversations in the classrooms, students are more likely to enhance critical thinking by learning about different cultural knowledge and social perspectives.

Even though it might represent a difficult task for professors and students, I believe that these conversations in the classroom should be fostered rather than suppressed. By intentionally or unintentionally excluding this “hard conversation” from our daily discussions in classrooms, educational institutions are not only shaping the education provided, but they are also failing to acknowledge race and its significant influence in the health outcomes of the current healthcare system. I argue that professors should,

therefore, receive adequate support and training in order to feel confident about their ability to handle and foster these conversations in the classroom. To close our eyes and ears to those questions would represent a step backwards in the road towards the desired qualifications that are supposed to boost the performance of the current healthcare workforce.

The Tug of War Between Teaching and Research

When talking about critical thinking, most interviewees agreed that teaching it requires time and effort. They were in agreement that professors should deliberately choose teaching strategies that promote active learning and stimulate reflection and interaction between students. Even though several professors expressed a reasonable understanding of critical thinking instruction, complications in their discourse flourished when I asked questions of how that understanding was being translated into practice in the classroom. The lack of time was always regarded as the factor preventing them from doing things differently, as stated by this professor:

I don't have the time. You have to grade 160 exams plus you have to have consistency, like: "OK, this student answered this way. This student answered this way." And you get 160 different answers; who gets the most credit? That's really not easy. That's a lot of work. And when you have as a part of your job description to do research, it gets difficult to do. And so you're just not going to see it. – *Faculty*.

His brief mention of research and teaching roles caught my attention. I was aware of the struggles in that realm because other professors have talked about that before in previous interviews. Despite my efforts of exploring that issue during the interview, he

didn't show any interest in keeping that conversation going. Interviewing him was a challenge because he was very unspecific and brief in his answers. But our conversation improved significantly after I turned off the recorder, as I registered in the fieldnotes:

I just finished an interview with [professor A]. During the interview, he was almost apologetic when talking about the absence of another instructor for [required pharmacy course taught by professor A from the Twin Cities campus and transmitted through ITV to Duluth campus] in Duluth. He kept saying: "I'm not saying it's good or bad. I'm not upset with anybody". Every time I asked something related to the pedagogical strategies he used in class, he would go around the topic and slip into another discussion. I felt he was not comfortable talking about it and I decided to do not push. (...) He also briefly mentioned, during the interview, the difficulties of "having part of your job description to do research". I became curious, since I have heard about it before from [faculty member X] and [faculty member Z]. I probed more, but he cut the conversation by saying that the answer was "several levels above his head". His apparent resilience did not convince me and I decided to try one more time, after turning off the recorder. I thanked him for the interview and I said he brought up a very important topic when he mentioned the challenges faced by professors torn between teaching and research duties. I said "I've heard about it before from some other professors". That simple sentence ignited another 15 minutes of intense flow of ideas. I had inadvertently tapped into a spring of deep reflections. He continued:

"Well, the thing I didn't feel comfortable talking about before is that I understand the Dean's position when she says that the good professor is the professor who does research. I do agree with her. But teaching is an entire different business, equally important. I feel like, well, I would love to try something new, to incorporate some active learning stuff, to read a

paper about teaching strategies, but I've got this grant to apply for, this paper to publish, this research to do, so I don't have time. And, besides that, I get fairly good reviews from the students, so I don't have much incentive to change, you know?" The conversation went on and on, with him talking cathartically about research, teaching, and tenure, while I was listening carefully to him and jotting down some notes (...)." – *Fieldnotes*, May, 2012.

His veiled criticism of the conflict between teaching and research was also corroborated by several other professors, like this one, who expressed his frustration with the expectations of traditional academic promotions:

"It's having a model of learning where you've invited in and it allows practice to occur and to be delivered as knowledge. We don't have it, do we? If your job is something that makes sure you do research to save your job, to get tenure... that's where the college went. If we had groups that were valued because they would also do their practice, we would acknowledge that perhaps they would have to limit their research component... But if they don't value it, it doesn't get funded, and therefore it doesn't get applied. That's the bottom line". – *Faculty*

The University of Minnesota College of Pharmacy has a long tradition of dedication to both scholarship and education (UMN, 2013). Academic literature is full of statements on how teaching and research are inextricably linked and how they, together, make up for the essence of a university (Elton, 1986). However, the relative importance of each one and the relationships between them have been ardently contested. There are arguments supporting many possible permutations between teaching and research in academia. Braxton (1996) describes essentially three perspectives, in which one suggests that the roles of teaching and research conflict with one another. The second perspective

holds that they are complimentary and the third one, according to him, contends that there is no relationship between teaching and research.

American educator Ernest Boyer (1990) deepened this discussion in his book *Scholarship Reconsidered: Priorities of the Professoriate*. He corroborated the point made by the faculty member quoted above by asserting that research activity competes with teaching obligations for time and content. He wrote:

At the very heart of the current debate – the single concern around which all others pivot – is the issue of faculty time. What’s really being called into question is the reward system and the key issue is this: what activities of the professoriate are most highly prized? After all, it’s futile to talk about improving the quality of teaching if, in the end, faculty are not given recognition of the time they spend with students (Boyer, 1990, p. xi).

As both teaching and high research productivity are labor intensive, it is nearly impossible for individuals to excel in both domains (Trice, 1992). Hattie and Marsh (1996) conducted a meta-analysis of 58 studies on this issue and they concluded that teaching and research are essentially unrelated. In another words, the likelihood that research productivity benefits teaching and vice versa is extremely small. This conclusion, they argued, does not imply that a university should in any way belittle its research accomplishments or its teaching excellence. However, it is also not defensible to claim that only good researchers are the most effective teachers, or that good teaching follows from more research.

Hattie and Marsh (1996) asserted that the goal for professors in higher education should not be publish or perish, or teach or impeach. The university should increase the

circumstances in which teaching and research have occasion to meet and it should also provide rewards for demonstrations of the genuine integration of teaching and research. The examples of strategies to increase this integration cited by Hattie and Marsh (1996) are well aligned with the ones that are likely to foster critical thinking in the classroom and they include: increase the skills of faculty to teach emphasizing the construction of knowledge by students rather than the conveying of knowledge by instructors; construct assignments that reward deep rather than only surface learning; develop strategies across all disciplines that emphasize the uncertainty of the task; and ensure that the students experience the process of artistic and scientific productivity (Hattie and Mash, 1996, p. 534). Creativity, commitment, and investigativeness are few of the traits fostered when teaching and research are associated in a meaningful and prolific way and when the university system rewards the joint effort between them.

Even though the issues of power, race, power, and the tug of war between teaching and scholarship endeavors were not comprehensively discussed by the participants in this research, it is my belief that the conversation started by some of them represents a significant step towards an education more consistent with the contemporary issues that afflict academia and health professions in general. Hopefully the “hard conversations” started by them in this chapter will open the way to other meaningful discussions in this realm, so long overdue in pharmacy education.

Final considerations

With this research, I had the objective to understand, describe and contextualize the concept of critical thinking in pharmacy as the profession shifts its focus from pharmaceutical products to patient care. Critical thinking has become a constant element in the discourses on pharmacy practice and the development of this competency has been emphasized in the professional pharmacy curriculum. I have identified significant gaps in the literature available on critical thinking in pharmacy education. The definition of critical thinking varies considerably from author to author in many other fields and I found that this concept is also not clear for students, faculty and curriculum stakeholders at the University of Minnesota College of Pharmacy.

The conduction of a doctoral study on such subject was not an easy task, given its subjective character and the multitude of nuances associated to it. However, my learning journey in these four years of study could not be richer. I have delved in a learning process that transformed and deepened my understanding of pharmacy education, pedagogical approaches, and the complex intersection between these two realms.

Critical thinking and problem solving were terms used almost interchangeably by the participants in this study. Nevertheless, the literature suggests that there are marcant differences between these two concepts. From an educational perspective, a clear definition of critical thinking in pharmacy is imperative to the design of strategies aimed to assist in the learning process and to the assessment of the learning outcomes. Although the accreditation body in pharmacy education suggested the adoption of the concept of

critical thinking published by the American Philosophical Association, the findings of this study suggested that there might be significant differences in the way pharmacists understand critical thinking skills applied to patient care. The inclusion of creativity among the habits leading to critical thinking is one of the marcant differences of how this skill set is understood in pharmacy. Since this research was conducted in one college of pharmacy, I argue that further investigation is warranted in order to deepen our understanding on these differences.

The movement from vaguely knowing critical thinking, to understanding and clarifying its meaning, to applying it in practice might lead to the expansion of the frontiers of knowledge in this field. This study added one more building block to the understanding of critical thinking in pharmacy. Educators, accrediting bodies, and employers claim that critical thinking is an essential skill to a competent pharmacist. It is time to move beyond “we know it when we see it” and focus equal attention on the systematic study of critical thinking in pharmacy practice. I believe that with a refined definition of what constitutes critical thinking in pharmacy practice related to patient care, the development of discipline-specific measures should be the following step.

The discomfort, expressed by the participants, with uncertainty and with the grayness and complexity of patient care is another finding that deserves further exploration. As any other health profession, pharmacy practice involving direct patient care is not an exact science. Patients do have more in their lives than taking a certain number of pills a day. So that “step further” mentioned by the participants – such as social issues, patient's experience, adherence – should, in fact, be considered not the

extra, but a fundamental part pharmacy practice. Teaching strategies used in the classroom should embrace the uncertainty in patient care as an inherent part of clinical practice, rather than substituting it with the provision of factual information not clearly connected to the patient.

Regarding the methods and pedagogical approaches used to teach critical thinking, I arrived to the same conclusion of Paul (1992), when he affirmed that “no neat set of recipes can foster critical thinking in students”. According to these findings, it is pertinent to affirm that many instructional methods have the potential to reinforce the importance and general applicability of critical thinking in pharmacy. However, several of them have been applied without achieving high success in this field. These findings are not new. In 1987, Linda Strand and Peter Morley argued that, although significant changes have occurred to pharmacy curriculum content at that point, a critical revisitation of the educational methods used in colleges of pharmacy were yet to take place. I felt disturbed to somehow arrive to a similar conclusion, several decades later.

Talking about critical thinking in guidelines, books, and papers is not enough. Students need to engage in the process in the classroom. In order for it to happen, students and professors must be committed to an active learning process. Pharmacy education should move away from curriculum centered approaches and acknowledge the student and the learning process as the principal focus of their strategies in the classroom.

The “grade mindset” of pharmacy students should be of particular concern to pharmacy educators. Other researchers already suggested that a “grade orientation” and a “learning orientation” on the part of the students tend to be inversely related (Kohn,

2002). A grade-oriented student body is an invitation for faculty and curriculum stakeholders to deepen their reflections of what sort of teaching strategies might elicit authentic interest in a course or subject matter. Efforts should be made to identify and apply forms of assessment that are less damaging to the students' learning process.

The University of Minnesota College of Pharmacy places great emphasis on preparing pharmacists for clinical practice. One of its goals listed in the 2011-2016 Strategic Plan is to “partner with the profession of pharmacy in making a patient-centered pharmacy practice the standard of care and a vital part of the health care delivery system.” (University of Minnesota, 2013). Students who participated in this study seemed ready to respond to the call, in pharmacy profession, for a patient-centered practice. The process of preparing students for this task is not a simple one. The findings of this study suggest that the college of pharmacy could improve its accomplishments in this field by placing the students at the center of the educational process. Educators and act not as “filters of information” but as bridges to connect the students to the knowledge they need in order to take care of patients. I believe that the focus on student-centered learning strategies are more likely to yield the results expected from pharmacy curriculum.

The dissatisfaction and disengagement expressed by some students regarding the content they have been learning in classroom ties back to the type of knowledge has been taught in pharmacy school and how currently useful it is in terms of solving current problems or having direct implication in answering questions that students are likely to face in practice. There is one sentence I heard in one of the focus groups that keeps echoing in my memory: if I cannot think of the connection with the patient, why to learn

it at all? I think this is a fair and legitimate question. As wisely said by a peer-analyst collaborator, “there is a definite need for the hard sciences in the curriculum, but the way in which they are currently delivered has masked their relevance and application. The content that is very important and practical is sometimes not highlighted or presented in a context where it would be used as a practicing pharmacist.”

According to the findings of this study, the link to the patient should not be lost, at the risk of dismantling the essence of the professional education leading to the PharmD degree itself. ACPE has embraced pharmaceutical care as the mission of pharmacy profession and, therefore, colleges and schools of pharmacy should make every effort needed to connect what has been taught and learned in the classroom with the ultimate goals of pharmacy practice – the patient wellbeing.

We are facing a world that is becoming increasingly more complex. The decisions we make can well have significant long-term implications both for ourselves and for those who follow us. If we can successfully prepare students for that world, we will, by implication, prepare them for the diversities intrinsic to it. The task under focus is to find ways to teach in a manner that students learn to reason well through issues embodied in change, complexity, and diversity. Critical thinking is an important skill set that equips pharmacists with cognitive tools to properly address those issues. There is still much to be done and to be discovered in this field and I believe that the findings of this study represent a significant contribution to the preparation of pharmacists committed to effective patient care.

References

- American Association of Colleges of Pharmacy – AACCP (1989). Commission to Implement Change in Pharmaceutical Education. *What is the mission of pharmaceutical education?* Background paper I. Retrieved from:
<http://www.aacp.org/resources/historicaldocuments/Documents/BackgroundPaper1.pdf>
- AACP (1991). Commission to Implement Change in Pharmaceutical Education. *Background paper II: entry-level curricular outcomes, curricular content and educational process.* Retrieved from:
<http://www.aacp.org/resources/historicaldocuments/Documents/BackgroundPaper2.pdf>
- AACP (n.d.) *JCPP future vision of pharmacy practice.* Retrieved from:
http://www.aacp.org/Docs/MainNavigation/Resources/6725_JCPPFutureVisionofPharmacyPracticeFINAL.pdf.
- Accreditation Council for Pharmacy Education - ACPE (2006). *Accreditation standards and guidelines for the professional program in pharmacy leading to the Doctor of Pharmacy degree.* Chicago: Author.
- Adams, M. H. (1999). A longitudinal evaluation of baccalaureate nursing students' critical thinking abilities. *Journal of Nursing Education*, 38(3), 139-141.
- Adams, E. H., Leader, W. G., Jain, G., & Lawrence, L. W. (2008). Predictive value of California Critical Thinking Skills Test as to first year and cumulative GPA. *American Journal of Pharmaceutical Education*, 72(3):11. Article 72.
- Allen, D. D., & Bond, C. A. (2001). Prepharmacy predictors of success in pharmacy school: grade point averages, pharmacy college admissions test, communication abilities, and critical thinking skills. *Pharmacotherapy*; 21(7): 842-849.

- Austin, Z., Gregory, P. A. M., & Chiu, S. (2008). Use of reflection-in-action and self-assessment to promote critical thinking among pharmacy students. *American Journal of Pharmaceutical Education*, 72(3).
- Axtell, J. (1998). *The pleasures of academe: a celebration and defense of higher education*. University of Nebraska Press.
- Baia, P., & Strang, A. (2012). An elective course to promote academic pharmacy as a career. *American Journal of Pharmaceutical Education*, 76(2).
- Bartlett, D. J., & Cox, P. D. (2002). Measuring change in students' critical thinking ability: Implications for health care education. *Journal of Allied Health*, 31(2), 64-69.
- Beane, J. A. (1995). Curriculum Integration and the Disciplines of Knowledge. *The Phi Delta Kappan*, 76(8), 616-622.
- Behrens, P. J. J. (1995). The Watson-Glaser Critical Thinking Appraisal and academic performance of diploma school students. *The Journal of Nursing Education*, 35(1), 34-36.
- Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: a critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775-786.
- Bensley, D. A. (2011). Rules for reasoning revisited: toward a scientific conception of critical thinking. In Horvath, C. P., & Forte, J.M. (Eds.), *Critical thinking*. New York: Nova Science Publishers.
- Berry, J. (2009). Technology support in nursing education: Clickers in the classroom. *Nursing Education Perspectives*, 30(5), 295-298. Retrieved from

<http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=2010428398&site=ehost-live>

- Bloom, B. S. (1956). *Taxonomy of educational objectives, Handbook 1: Cognitive domain* (1st ed.). New York: David McKay Company.
- Blouin, R. A., Riffée, W. H., Robinson, E. T., Beck, D. E., Green, C., Joyner, P. U., . . . Pollack, G. M. (2009). Roles of innovation in education delivery. *American Journal of Pharmaceutical Education*, 73(8).
- Bonwell, C. C., & Sutherland, T. E. (1996). The active learning continuum: Choosing activities to engage students in the classroom. *New Directions for Teaching and Learning*, 1996(67), 3-16. doi:10.1002/tl.37219966704.
- Boyce, E. G., & Lawson, L. A. (2009). White paper on the pre-professional curriculum in preparation for the doctor of pharmacy educational programs. *American Journal of Pharmaceutical Education*, 73(8).
- Boyer, E. L. (1990). *Scholarship reconsidered: priorities of the professoriate*. New York, NY: The Carnegie Foundation for the Advancement of Teaching.
- Braun, L., Fausto-Sterling, A., Fullwiley, D., Hammonds, E. M., Nelson, A., . . . Shields, A. E. (2007). Racial categories in medical practice: how useful are they? *PLoS Medicine* 4(9): e271.
- Braxton, J. M. (1996). Contrasting perspectives on the relationship between teaching and research. *New Directions for Institutional Research*, 90, 5-14.

- Brazeau, G. A., Meyer, S. M., Belsey, M., Bednarczyk, E. M., Bilic, S., Bullock, J., ... Traynor, A. P. (2009). Future pharmacy graduates: making more opportunities than we see. *American Journal of Pharmaceutical Education*, 73(8).
- Briskin, L. (1995). Negotiating power in the classroom: the example of group work. *Canadian Woman Studies*, 17(4), 23-28.
- Britzman, D. (2003). *Practice makes practice: A critical study of learning to teach*. Albany, NY: State University of New York Press.
- Brookfield, S. D. (1987). *Developing critical thinkers: Challenging adults to explore alternative ways of thinking and acting*. San Francisco, CA: Jossey-Bass.
- Brookfield, S. D. (2005). *The power of critical theory: liberating adult learning and teaching*. San Francisco, CA: Jossey-Bass.
- Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2(2), 141-178. Retrieved from <http://www.jstor.org/stable/1466837>.
- Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review*, 31, 21-32.
- Burgois, P. (2002). Ethnography's troubles and the reproduction of academic habitus. *International Journal of Qualitative Studies in Education*, 15(4), 417-420.
- Caldwell, J. E. (2007). Clickers in the large classroom: current research and best-practice tips. *CBE-Life Sciences Education*, 6(1), 9-20. doi:10.1187/cbe.06-12-0205.
- Caldwell, J. E. (2012). Inquiry into identity: teaching critical thinking through a study of race, class, and gender. *Middle School Journal*, 6-15.

- Cannon, L. W. (1990). Fostering positive race, class, and gender dynamics in the classroom. *Women's Studies Quarterly*, 1 & 2, 126-134.
- Case, B. (1994). Walking around the elephant: A critical thinking strategy for decision making. *The Journal of Continuing Education in Nursing*, 25(3), 101-109.
- Chaplin, S. (2007). A model of student success: coaching students to develop critical thinking skills in introductory biology courses. *International Journal for the Scholarship of Teaching and Learning*, 1(2).
- Cipolle, R. J., Strand, L. M., & Morley, P. C. (2012). *Pharmaceutical care practice: the patient centered approach to medication management* (3rd ed.). New York, NY: McGraw-Hill.
- Cipolle, R. J., Strand, L. M., & Morley, P. C. (2004). *Pharmaceutical care practice: the clinician's guide* (2nd ed.). New York, NY: McGraw-Hill.
- Cisneros, R. M. (2009). Assessment of critical thinking in pharmacy students. *American Journal of Pharmaceutical Education*, 73(4).
- Cisneros, R. M., Salisbury-Glennon, J. D., Anderson-Harper, H. M. (2002). Status of problem-based learning research in pharmacy education: A call for future research. *American Journal of Pharmaceutical Education*, 66:19–26.
- College of Pharmacy. University of Minnesota. (2006). *General ability-based educational outcomes*. Retrieved from:
http://www.pharmacy.umn.edu/prod/groups/cop/@pub/@cop/@pharmd/documents/article/cop_article_132757.pdf
- Colucciello, M. L. L. (1997). Critical thinking skills and dispositions of baccalaureate

- nursing students: a conceptual model for evaluation. *Journal of Professional Nursing*, 13(4), 236-45.
- Cook-Sather, A. (2002). Authorizing students' perspectives: towards trust, dialogue, and change in education. *Educational Research*, 31(4), 3-14.
- Covington, M. V., & Mueller, K. J. (2001). Intrinsic versus extrinsic motivation: An approach/avoidance reformulation. *Educational Psychology Review*, 13, 157-176.
- Cox, W. C. (2008). The health sciences reasoning test as a tool to aid in the admissions process. *American Journal of Pharmaceutical Education*, 72(3).
- Cragg, C. E., & Andrusyszyn, M. A. (2004). Outcomes of master's education in nursing. *International Journal of Nursing Education Scholarship*, 1(1).
- Cranley, L. A., Doran, D. M., Tourangeau, A. E., Kushniruk, A., Nagle, L. (2012). Recognizing and responding to uncertainty: a grounded theory of nurse's uncertainty. *Worldviews on Evidence-Based Nursing*, 9(3), 149-158.
- Curtis, D.D. (2004). The assessment of generic skills. In Gibb, J. (Ed.) *Generic skills in vocational education and training: Research findings*, Station Arcade, South Australia: NCVER.
- Daly, W. M. (1998). Critical thinking as an outcome of nursing education. What is it? Why is it important to nursing practice? *Journal of Advanced Nursing*, 28(2): 323-31.
- Dam, G. T., & Volman, M. (2004). Critical thinking as a citizenship competence: teaching strategies. *Learning and Instruction*, 14: 359-379.

- Davies, P. (1999). What is evidence-based education? *British Journal of Educational Studies*, 47(2): 108-121.
- Dawn, S., Dominguez, K.D., Troutman, W.G., Bond, R., & Cone, C. (2011). Instructional scaffolding to improve students' skills in evaluating clinical literature. *American Journal of Pharmaceutical Education*, 75(4), article 62.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125(6): 627-668.
- DeForge, B. R., Sobal, J. (1989). Intolerance of ambiguity in students entering medical school. *Social Science & Medicine*, 28: 869-874.
- Dewey, J. (1910). *How we think*. Boston: D.C. Heath & Co.
- Dewey, J. 1938. *Experience and education*. New York, NY: Kappa Delta Pi.
- Diwakar, V. (2002). Commentary: The baby is thrown out with the bathwater. *British Medical Journal*, 325: 695-696.
- Dogra, N., Giordano, J., & France, N. (2007). Cultural diversity teaching and issues of uncertainty: the findings of a qualitative study. *BMC Medical Education*, 7(8).
- Doherty, J. J., Hansen, M. A., & Kaya, K. K. (1999). Teaching information skills in the information age: the need for critical thinking. *Library Philosophy and Practice*, 1 (2).
- Droege, M. (2003). The role of reflective practice in pharmacy. *Education for Health*, 1(16), 68-74.

Drugalis, J. R., DiPiro, J. T., Zeolla, M. M., & Schwinghammer, T. L. (2006). A career in academic pharmacy: opportunities, challenges, and rewards. *American Journal of Pharmaceutical Education*, 70(1).

Dunn, R., Giannitti, M. C., Murray, J. B., Rossi, I., Geisert, G., & Quinn, P. (1990). Grouping students for instruction: Effects of learning style on achievement and attitudes. *Journal of Social Psychology*, 130(4), 485-494.

Durkheim, E. (1951). *Suicide: A study in sociology*. Glencoe, IL: The Free Press.

Earl, G. L. (2009). Using cooperative learning for a drug information assignment. *American Journal of Pharmaceutical Education*, 73(7): 132.

Edgerton, R. (2001). Education white paper. Retrieved from <http://www.pewundergradforum.org/wp1.html>

Elton, L. (1986). Research and teaching: Symbiosis or conflict. *Higher Education*, 15(3/4), 299-304. Retrieved from <http://www.jstor.org/stable/3446692>.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing ethnographic fieldnotes*. Chicago: The University of Chicago Press.

Ennis, R. H. (1987). A taxonomy of critical thinking disposition and abilities. In J.B. Baron and R.J. Sternberg (Eds.) *Teaching thinking skills: theory and practice* (9-26). New York: Freeman.

Epstein, R. M. (2007). Assessment in medical education. *New England Journal of Medicine*, 356(4), 387-396. doi:10.1056/NEJMra054784.

- Facione, N. C., & Facione, P. A. (2008). Critical thinking and clinical judgment. In N. C. Facione, & P. A. Facione (Eds.). *Critical thinking and clinical reasoning in the health sciences: A teaching anthology* (1-13), Millbrae, CA: The California Academic Press.
- Facione, P. A. (2013). *Critical thinking: what it is and why it counts. Insight Assessment.*
- Facione, P. A. (1990). *Executive summary - critical thinking: A statement of expert consensus for purposes of educational assessment and instruction.* Millbrae, CA: The California Academic Press.
- Facione, P. A., & Facione, N. C. (1994). *The California critical thinking skills test: Test manual.* Millbrae, CA: California Academic Press.
- Facione, P. A., Facione, N. C., & Giancarlo, C. A. (1996). *The California critical thinking disposition inventory: Test manual.* Millbrae, CA: California Academic Press.
- Farris, K. B., Demb, A., Janke, K. K., Kelley, K., & Scott, S. A. (2009). Assessment to transform competency-based curricula. *American Journal of Pharmaceutical Education, 73*(8).
- Felder, R. M., & Brent, R. (1996). Navigating the bumpy road to student-centered instruction. *College Teaching, 44*(2), 43-47. Retrieved from <http://www.jstor.org/stable/27558762>.
- Field, M. J. & Lohr, K. N. (1992). *Guidelines of clinical practice: from development to use.* Washington, DC: The National Academies Press.
- Finn, J. D., Pannozzo, G. M., & Achilles, C. M. (2003). The “Why’s” of class size: Student behavior in small classes. *Review of Educational Research, 73*(3), 321-368.

- Fisher, A. (2001). *Critical thinking: An introduction*. Cambridge, UK: Cambridge University Press.
- Foley, D. & Valenzuela, A. (2005). Critical ethnography: The politics of collaboration. In: N.K.Denzin & Y.S. Lincoln [Eds.] *The Sage Handbook of Qualitative Research*. 3rd ed., 217-234. London: Sage.
- Forsyth, P. (2002). *How to motivate people*. Philadelphia, PA: The Sunday Times.
- Fowler, L. P. (1998). Improving critical thinking in nursing practice. *Journal of Nurses Staff Development*, 14(4), 183-187.
- Freire, P. (1970). *Pedagogy of the Oppressed*. New York, NY: Continuum.
- Gibson, L. S. (1998). Teaching as an encounter with the self: Unraveling the mix of personal beliefs, education ideologies, and pedagogical practices. *Anthropology & Education Quarterly*, 29(3), 360-371.
- Glaser, E. M. (1941). *An experiment in the development of critical thinking*. New York: Bureau of Publications, Teachers College, Columbia University.
- Gokhale, A. A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education*, 7(1).
- Green, C. S., & Klug, H. G. (1990). Teaching critical thinking and writing through debates: an experimental evaluation. *Teaching Sociology*, 18(4), 462-471.
- Grossman, R. W. (1994). Encouraging critical thinking using the case study method and cooperative learning techniques. *Journal on Excellence in College Teaching*, 5(1), 7-20.

- Halpern, D. F. (1999) Teaching for critical thinking: helping college students develop the skills and dispositions of a critical thinker. *New Directions for Teaching and Learning*, 80, 69-74.
- Hattie, J., & Marsh, H. W. (1996). The relationship between research and teaching: a meta-analysis. *Review of Educational Research*, 66(4), 507-542.
- Herreid, C.F. (2004). Can case studies be used to teach critical thinking? *Journal of College Science Teaching*, 33(6), 12–14.
- Heywood, J. (2000). *Assessment in higher education: student learning, teaching, programmes and institutions*. London: Jessica Kingsley.
- Hicks-Moore, S., & Pastirik, P. J. (2006). Evaluating critical thinking in clinical concept maps: A pilot study. *International Journal of Nursing Education Scholarship*, 3(1).
- Himley, M. (1997). *Political movements in the classroom*. Portsmouth, NH: Heinemann/Boynton Cook.
- Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, 42, 99-107.
- Hooks, b. (2010). *Teaching critical thinking: Practical wisdom* (1st ed.). New York (NY): Routledge.
- Hooks, b. (1994). *Teaching to transgress: Education as the practice of freedom*. New York, NY: Routledge.
- Johnson-Bailey, J. & Cervero, R. M. (1997). Beyond facilitation in adult education: power

dynamics in teaching and learning practices. *27th Annual SCUTREA: Crossing Borders, Breaking Boundaries - Research in the Education of Adults*, London: Birkbeck College.

Jungnickel, P. W., Kelley, K. W., Hammer, D. P., Haines, S. T., & Marlowe, K. F. (2009). Addressing competencies for the future in the professional curriculum. *American Journal of Pharmaceutical Education*, 73(8).

Kidd, R. S. & Latif, D. A. (2003). Traditional and novel predictors of classroom and clerkship success of pharmacy students. *American Journal of Pharmaceutical Education*, 67(4).

Kincheloe, J. L., & McLaren, P. (2005). Rethinking critical theory and qualitative research. In N. K. Denzin, & Y. S. Lincoln (Eds.). *The sage handbook of qualitative research* (3rd ed., pp. 303-342). California: Sage Publications.

Kincheloe, J. L., McLaren, P., & Steinberg, R. (2011). Critical pedagogy and qualitative research: moving to the bricolage. In N. K. Denzin & Y. S. Lincoln (Eds.). *The Sage Handbook of Qualitative Research* (4th ed, pp. 163-177). LA: Sage Publications.

Kohn, A. (1999). *Punished by Rewards: The trouble with gold stars, incentive plans, A's, praise, and other bribes*. Boston: Houghton Mifflin.

Krueger, R. A. & Casey, M. A. (2009). *Focus groups: A practical guide for applied research* (4th ed). Thousand Oaks: Sage Publications.

Lane, J. E. (2007). Spider web of oversight: latent and manifest regulatory controls in higher education. *Journal of Higher Education*, 78(6), 1-30.

Lightner, R. & Benander, R. (2010). Student learning outcomes: barriers and solutions

- for faculty development. *Journal of Faculty Development*, 24(2).
- Lin, S. J., & Crawford, S.Y. (2007). An online debate series for first-year pharmacy students. *American Journal of Pharmaceutical Education*, 71(1).
- Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.
- Lisko, S. A. & O'dell, V. (2010). Integration of theory and practice: experiential learning theory and Nursing education. *Nursing Education Perspectives*, 31(2), 106-108.
- Lobb, W. B., Wilkin, N. E., McCaffrey, D. J., Wilson, M. C., Bentley, J. P. (2006). The predictive utility of nontraditional test scores for first-year pharmacy student academic performance. *American Journal of Pharmaceutical Education*, 70(6).
- Losinski, V. (2010). *Education for action: Understanding the development of pharmaceutical care practitioners*. (Doctoral proposal). College of Pharmacy, University of Minnesota. Unpublished document.
- Lowe, W. (2011). Is the sun setting on lecture-based education? *International Journal of Therapeutic Massage & Bodywork*, 4(4), 7-9.
- Lubawy, W. C. (2003). Evaluating teaching using the best practice model. *American Journal of Pharmaceutical Education*, 67(3), Article 87.
- Ludmerer, K. M. (1985). *Learning to heal: the development of American medical education*. Baltimore: The Johns Hopkins University Press.
- Madison, D. S. (2005). *Critical ethnography: Method, ethics, and performance*. California: Sage Publications.

- Mangena, A. & Chabeli, M. M. (2005). Strategies to overcome obstacles in the facilitation of critical thinking in nursing education. *Nurse Education Today*, 25(4), 291-8.
- Manke, M. P. (1997) *Classroom power relations: Understanding student-teacher interaction*. Mahwah, NJ: Lawrence Erlbaum.
- Martin, B. (1998). *Tied knowledge: power in higher education*. Retrieved from: <http://www.uow.edu.au/~bmartin/pubs/98tk/tiedknowledge.pdf>
- Mayan, M. J. (2009). *Essentials of qualitative inquiry*. Walnut Creek, CA: Left Coast Press.
- McNatty, D., Cox, C. D., & Seifert, C. F. (2007). Assessment of teaching experiences completed during accredited pharmacy residency programs. *American Journal of Pharmaceutical Education*, 71(5).
- McPeck, J. (1981). *Critical thinking and education*. Don Mills: Oxford University Press.
- Meyers, C. (1986). *Teaching students to think critically*. San Francisco: Jossey-Bass Publishers.
- Miller, D. R. (2004). An Assessment of critical thinking: Can pharmacy students evaluate clinical studies like experts? *American Journal of Pharmaceutical Education*, 68.
- Miller, D. R. (2003). Longitudinal assessment of critical thinking in pharmacy students. *American Journal of Pharmaceutical Education*, 67.
- Miller, M. A. & Malcolm, N. S. (1990). Critical thinking in the nursing curriculum. *Nursing and Health Care*, 11(2), 67-73.

- Mishel, M. H. (1981). The measurement of uncertainty in illness. *Nursing Research*, 30(5), p. 258-263.
- Narayan, U. (1988). Working together across difference: Some considerations on emotions and political practice. *Hypatia*, 3(2), 31-47.
- Niemi, H. (2002). Active learning—a cultural change needed in teacher education and schools. *Teaching and Teacher Education*, 18(7), 763-780.
- Noblit, G. W., Flores, S. Y., & Murillo, E. G. (2004). *Postcritical ethnography: An introduction*. Cress, NJ: Hampton Press.
- Norris, S. P. & Ennis, R. H. (1989). *Evaluating Critical Thinking*. Pacific Grove, CA: Midwest Publications.
- Novak, S., Shah, S., Wilson, J. P., Lawson, K. A., & Salzman, R. D. (2006). Pharmacy students' learning styles before and after a problem-based learning experience. *American Journal of Pharmaceutical Education*, 70(4), Article 74.
- Nunez-Smith, M., Curry, L. A., [...], & Bradley, E. H. (2008) Healthcare workplace conversations on race and the perspectives of physicians of African descent. *Journal of General Internal Medicine*, 23(9), 1471–1476.
- Oderda, G. M. et al. (2010). An environmental scan of the status of critical thinking and problem solving skills in colleges/schools of pharmacy: report of the 2009-2010 Academic Affairs Committee. *American Journal of Pharmaceutical Education*, 74(10).

- Oja, K. J. (2011). Using problem-based learning in the clinical setting to improve nursing students' critical thinking: an evidence review. *Journal of Nursing Education*, 50(3):145–51.
- Pascarella, E. & Terenzini, P. (1991). *How college affects students*. San Francisco: Jossey-Bass.
- Paul, R. (1990). *Critical thinking: what every person needs to survive in a rapidly changing world*. Rohnert Park, California: Center for Critical Thinking and Moral Critique.
- Paul, W.R., Elder, L. (2002). *Critical thinking: tool for taking charge of your professional and personal life*. Upper Saddle River, NJ: Financial Times Prentice Hall.
- Paul, R., Elder, L., & Bartell, T. (1997). *California teacher preparation for instruction in critical thinking: Research findings and policy recommendations*. Sacramento: California Commission on Teacher Credentialing.
- Phillips, C., R., Chesnut, R. J., & Rospond, R. M. (2004). The California critical thinking instruments of benchmarking, program assessment, and directing curricular change. *American Journal of Pharmaceutical Education*, 68(4).
- Pilcher, J. K. (1994). The value-driven meaning of grades. *Educational Assessment*, 2(1), 69-88.
- Pinnegar, S., & Erickson, L. (2010). Teacher-centered curriculum. In C. Kridel (Ed.), *Encyclopedia of curriculum studies*. (pp. 849-850). Thousand Oaks, CA: SAGE Publications, Inc.
- Portelli, J. P. (1994). The challenge of teaching for critical thinking. *McGill Journal of Education*, 29(2), 137-152.

- Powers, M. F., & Jones-Walker, J. (2005). An interdisciplinary collaboration to improve critical thinking among pharmacy students. *American Journal of Pharmaceutical Education*, 69(4).
- Prensky M. (2001). Digital natives, digital immigrants. Part 1. *On the Horizon*, 9(5),1–6.
- Preszler, R. W. (2009). Replacing lecture with peer-led workshops improves student learning. *Life Sciences Education*, 8, 182-192.
- Profetto-McGrath, J. (2007). Critical thinking as an outcome of context-based learning among post RN students: A literature review. *Nurse Education Today*, 27(5), 420-6.
- Pungente, M. D., Wasan, K. M., & Moffett, C. (2003). Using learning styles to evaluate first-year pharmacy student's preferences toward different activities associated with the problem-based learning approach. *American Journal of Pharmaceutical Education*, 66, 119-124.
- Rohe, D. E., Barrier, P. A., Clark, M. M., Cook, D. A., Vickers, K. S., & Decker, P. A. (2006). The benefits of pass-fail grading on stress, mood, and group cohesion in medical students. *Mayo Clinic Proceedings*, 81(11), 1443-1448.
- Romanelli, F., Bird, E., & Ryan, M. (2009). Learning styles: a review of theory, application and best practices. *American Journal of Pharmaceutical Education*, 73(1), Article 9.
- Romanelli, F., Smith, K. M., Brandt, B. F. (2005). Teaching residents how to teach: a scholarship of teaching and learning certificate program (STLC) for pharmacy residents. *American Journal of Pharmaceutical Education*, 69, 126-132.

- Ross, L.A., Crabtree, B. L., Theilman, G. D., Ross, B. S., Cleary, J. D., & Byrd, H. J. (2007). Implementation and refinement of a problem-based learning model: A ten-year experience. *American Journal of Pharmaceutical Education*, 71(1). Article 17.
- Rubin, H. J. & Rubin, I. S. (2005). *Qualitative interviewing: the art of hearing data*. (2nd ed). Thousand Oaks: Sage Publications.
- Ryan, R. M. & Deci, E. L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54-67.
- Samarakoon, L., Fernando, T., Rodrigo, C., & Rajapakse, S. (2013). Learning styles and approaches to learning among medical undergraduates and postgraduates. *BMC Medical Education*, 13(1), 42. Retrieved from <http://www.biomedcentral.com/1472-6920/13/42>
- Sandars J., & Morrison C. (2007). What is the net generation? The challenge for future medical education. *Medical Teacher*, 29, 85–88.
- Scheffer, B. K. & Rubenfeld, M. G. (2000). A consensus statement on critical thinking in Nursing. *Journal of Nursing Education*, 39(8), 352-359.
- Scott, J. N., Markert, R. J., & Dunn, M. M. (1998). Critical thinking: change during medical school and relationship to performance in clinical clerkships. *Medical Education*, 32, 14-18.
- Seldomridge, L. A. & Walsh, C. M. (2006). Measuring critical thinking in graduate education: what do we know? *Nurse Educator*, 31 (3), 132-137.

- Siegel, H. (1988). *Educating reason: Rationality, critical thinking, and education*. New York, NY: Routledge.
- Simpson, E. & Courtney, M. D. (2002). Critical thinking in nursing education: literature review. *International Journal of Nursing Practice*, 8, 89-98.
- Shor, I. (1992). *Empowering education: Critical teaching for social change*. Chicago: University of Chicago Press.
- Shor, I. & Freire, P. (1987). *A pedagogy for liberation: Dialogues on transforming education*. South Hadley, Massachusetts: Bergin & Garvey Publishers.
- Smith, L.R. (2000). *Issues impacting on the quality of assessment in vocational education and training in Queensland*. Brisbane, Australia: Department of Employment, Training and Industrial Relations.
- Snipes, S., Sellers, S., Tafawa, A., Cooper, L., Fields, J., & Bonham, V. (2011). Is race medically relevant? A qualitative study of physicians' attitudes about the role of race in treatment decision-making. *BMC Health Services Research*, 11(1), 183. Retrieved from <http://www.biomedcentral.com/1472-6963/11/183>
- Stewart, D. W., Shamdasani, P. N., & Rook, D. W. (2007). *Focus groups: Theory and practice* (2nd ed). Thousand Oaks: Sage Publications.
- Strand, L. M. & Morley, P. C. (1987). Evolving health care systems: academic implications for teaching methodologies with emphasis on administration and practice. *American Journal of Pharmaceutical Education*, 51, 402-406.
- Street, A. F. (1992). *Inside nursing: A critical ethnography of clinical nursing practice*. Albany: State University of New York Press.

- Stupans, I., Owen, S., Ryan, G., Woulfe, J., & McKauge, L. (2010). Scaffolding patient counselling skills in Australian university pharmacy programs. *Asia-Pacific Journal of Cooperative Education, 11*(2), 29-37.
- Taras, M. (2002). Using assessment for learning and learning from assessment. *Assessment & Evaluation in Higher Education, 27*(6).
- Tisdell, E. J. (1993). Interlocking systems of power, privilege, and oppression in adult higher education classes. *Adult Education Quarterly, 43*(4), 203-226.
- Trice, A.J. (1992). The tensions between teaching and scholarship. *Chronicles of Higher Education, B4*.
- Tsui, L. (1999). Courses and instruction affecting critical thinking. *Research in Higher Education, 40*(2), 185-200.
- University of Minnesota College of Pharmacy. (2012). PharmD Professional Program.
Retrieved from:
http://www.pharmacy.umn.edu/pharmd/admissions/process/statistics/index.htm#sth_ash.tUu7Osbx.dpuf Accessed: July 1st, 2013.
- University of Minnesota College of Pharmacy (2013). Experiential Education Program.
Retrieved from <http://www.pharmacy.umn.edu/pharmd/eep/> Accessed: Jun 28th, 2013.
- Veloski, J. J., Rabinowitz, H. K., Robeson, M. R., & Young, P. R. (1999). Patients don't present with five choices: An alternative to multiple-choice tests in assessing physicians' competence. *Academic Medicine, 74*(5), 539-546.
- Vlasses, P. H. (2010). Reflections on a decade of progress in pharmacy education: reasons for celebration. *American Journal of Pharmaceutical Education, 74*(9), 174.

- Watson, G., Glaser, E. M. (1980). *Watson-Glaser Critical Thinking Appraisal Manual*. San Antonio, TX: The Psychological Corporation.
- Willingham, D. T. (2007). Critical thinking: why is it so hard to teach? *American Educator*, 8-19.
- Wolcott, H. F. (2005). *The art of fieldwork* (2nd ed.). Walnut Creek, CA: Altamira Press.
- Wolcott, H. F. (2008). *Ethnography: A way of seeing* (2nd ed.). Lanham, MD: Altamira Press.
- Wolyniak, M.J. (2003). Balancing teaching and research experiences in doctoral training programs: lessons for the future teacher. *Cell Biology Education* 2(4), 228-32.
- Woolf, S. H., Grol, R., Hutchinson, A., Eccles, M., & Grimshaw, J. (1999). Potential benefits, limitations, and harms of clinical guidelines. *British Medical Journal*, 318(7182), 527-530.
- Zdanowicz, M. M. (2009). The pharmacology of immunosuppression. *American Journal of Pharmaceutical Education*, 73(8).
- Zeidner, M. (1987). Essay versus multiple-choice type classroom exams: The student's perspective. *The Journal of Educational Research*, 80(6), 352-358. Retrieved from: <http://www.jstor.org/stable/27540265>
- Zerilli, T., & Cicero, L. (2009). New admissions procedure: Impact on the health sciences reasoning test scores of P-1 students. *American Journal of Pharmaceutical Education*, 73(4).

APPENDIX I: Guide for interviews with students

INTERVIEW WITH STUDENTS

QUESTIONS

Please take your time to answer the following questions. There are no right or wrong answers, so feel comfortable to share your point of view. Your answers are confidential and your name will not be included in any reports related to this research. There is no limit of words, you can write as much as you want and I am kindly asking you to provide as much details as you can, so it will be easier for me to understand your perspective.

THANK YOU SO MUCH FOR YOUR PARTICIPATION!

1. What is the first thing that comes to your mind when you hear the words “critical thinking”? Please explain.
2. Critical thinking is one of the main educational outcomes of the PharmD curriculum at the University of Minnesota College of Pharmacy.
 - a. What does “critical thinking in pharmacy” mean to you?
3. Think about a situation in a classroom at the University of Minnesota College of Pharmacy where you felt that your ability to think critically was **fostered**.
 - a. What was the situation like? Please provide as much details as you can in your description.
 - b. Why did this situation foster your ability to think critically? Please explain.
4. Think about a situation in a classroom at the University of Minnesota College of Pharmacy where you felt that your ability to think critically was **hindered**.
 - a. What was the situation like? Please provide as much details as you can in your description.
 - b. Why did this situation hinder your ability to think critically? Please explain.
5. Considering the classroom environment, what would be – in your opinion – the “ideal condition” to teach pharmacy students to think critically?
6. Would you like to add something else about critical thinking and pharmacy education that was not discussed in the questions before? Please feel free to share any additional thoughts you might have about the topic.
7. Do you have any suggestions of somebody else – faculty, staff, or other fellow students – knowledgeable in this subject?

*** THANK YOU FOR YOUR PARTICIPATION!!! ***

APPENDIX II: Guide for focus groups with students

FOCUS GROUP WITH STUDENTS

INTRODUCTION AND GROUND RULES

Good afternoon and welcome! Thanks for taking the time to join our discussion of critical thinking and pharmacy education. My name is Erika and I am the principal investigator in this study. The other moderators here are _____ and _____.

I am conducting this study to learn how critical thinking skills are taught and learned in the pharmacy's classroom. The knowledge that will emerge from this study will allow us to better define critical thinking skills in the context of pharmacy practice and to design learning activities to more effectively develop these essential skills in our future caregivers.

There are no right or wrong answers. We expect that you will have different points of view. Please feel free to share your point of view even if it differs from what others have said.

We are recording the session because we don't want to miss any of your comments. No names will be included in any reports. Your comments are confidential.

We have name tags in front of you. They help us to remember names, but they can also help you. Don't feel like you have to respond to me all the time. I you want to follow-up on something that someone has said, if you want to agree or disagree, or give an example, feel free to do that. Feel free to interact with each other as we go through the questions. I am here to ask questions, listen and make sure everyone has a chance to share. We are interested in hearing from each of you!

If you have a cell phone, please put it on the silent mode, and if you need to answer, step out to do so. Feel free to get more refreshments if you would like".

(5 MINUTES)

FOCUS GROUP QUESTIONS

Opening question: 3 MINUTES

So, let's begin. Let's go around the table and each of you please tell us who you are and what you most enjoy doing when you are not at the school.

Introductory question: 5 MINUTES

What is the first thing that comes to your mind when you hear the words “critical thinking”?

Transition question: 10 MINUTES

On the paper in front of you, jot down three characteristics of critical thinkers in pharmacy. (3 minutes) Which item do you consider to be the single most important on the list? Please circle it. Focus the following discussion on those items. Maybe ask who wants to share?

Key questions: 30 MINUTES

What does **critical thinking in pharmacy mean to you**? Please write down your personal definition on the sheet of paper in front of you. (3 minutes)

Think about a situation in a classroom where you felt that your ability to think critically was **fostered**. What was the situation like?

Think about a situation in a classroom where you felt that your ability to think critically was **hindered**. What was the situation like?

Ending questions: 5 MINUTES

Summary from the Moderating Team

Follow-up questions

***** THANK YOU FOR YOUR PARTICIPATION!!! *****

APPENDIX III: Consent forms

CONSENT FORM – PARTICIPANT OBSERVATION

Why do I think the way I do? Troubling the concept of critical thinking in pharmacy's classroom

You are invited to be in a research study of how we teach and learn critical thinking skills and abilities in the classroom. You were selected as a possible participant because your classroom is an environment where these skills and abilities are supposed to be used when professors teach and students learn how to provide optimum care to patients. . We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Erika Freitas, a PhD candidate at the Social and Administrative Pharmacy Program, University of Minnesota.

Background Information

The pedagogical processes through which students are supposed to become more reflective are an important issue in preparing critical thinkers in the healthcare field. The dynamics of knowledge production and acquisition is placing increasing demand on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems. The present qualitative study aims to assist in the unraveling the tangled web of personal beliefs and cultural perspectives on professional education and education ideologies which inform teaching-learning critical thinking skills in the pharmacy classroom nowadays.

Procedures:

If you agree to be in this study, I would ask you to give me permission to observe your classroom activities related to the course (include here the name of the course) in the Spring semester 2012. I will not interrupt you. I might take notes while observing the classes and I might ask you questions afterwards to clarify events related to the activities in the classroom. I will also ask you to grant me access to the didactic materials used in this course, as they might be helpful in understanding how critical thinking is taught and learned in the classroom.

Risks and Benefits of being in the Study

The risk of being in the study is that you might feel embarrassed or self-conscious while being observed. You are free to refuse to be observed at any time throughout this research process.

There are no direct benefits to you as a participant in this study.

Compensation:

There are no costs involved in participating in this study. You will not be paid for your participation.

Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question, to refuse to be observed at any time, or withdraw at any time without affecting those relationships.

Contacts and Questions:

Erika Freitas is the researcher responsible for conducting this study. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact me at frei0185@umn.edu, 612 223 9947. You may also contact my advisor, Dr. Djenane Ramalho de Oliveira, at djenane.oliveira@gmail.com, 612 860 1072.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

CONSENT FORM – INTERVIEWS

Why do I think the way I do? Troubling the concept of critical thinking in pharmacy's classroom

You are invited to be in a research study of how we teach and learn critical thinking skills and abilities in the classroom. You were selected as a possible participant because you are considered a knowledgeable person on this subject, as a student, professor or staff at the College of Pharmacy, University of Minnesota. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Erika Freitas, a PhD candidate at the Social and Administrative Pharmacy Program, University of Minnesota.

Background Information

The pedagogical processes through which students are supposed to become more reflective are an important issue in preparing critical thinkers in the healthcare field. The dynamics of knowledge production and acquisition is placing increasing demand on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems. The present qualitative study aims to assist in the unraveling the complex web of personal beliefs and cultural perspectives related to professional education and education ideologies which inform teaching-learning critical thinking skills in the pharmacy classroom nowadays.

Procedures:

If you agree to be in this study, I will interview you for 45 to 60 minutes in a place and time convenient to you. I will ask you questions about your experiences in classroom related to teaching and learning critical thinking skills and abilities. With your permission, the interview will be audio taped. The tapes will be erased after the interview is written down (transcribed) and your name will never be associated with the information obtained.

Risks and Benefits of being in the Study

The risk of being in the study is that you might feel embarrassed when talking to the researcher about your activities and experiences in the classroom and about your personal beliefs on education. If you feel any discomfort, you are free to deny any answer during the interview.

There are no direct benefits to you as a participant in this study.

Compensation:

There are no costs involved in participating in this study. You will not be paid for your participation.

Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question, to refuse to be observed at any time, or withdraw at any time without affecting those relationships.

Contacts and Questions:

Erika Freitas is the researcher responsible for conducting this study. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact me at frei0185@umn.edu, 612 223 9947. You may also contact my advisor, Dr. Djenane Ramalho de Oliveira, at djenane.oliveira@gmail.com, 612 860 1072.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

CONSENT FORM – WRITTEN INTERVIEWS

Why do I think the way I do? Troubling the concept of critical thinking in pharmacy's classroom

You are invited to be in a research study of how we teach and learn critical thinking skills and abilities in the classroom. You were selected as a possible participant because you are considered a knowledgeable person on this subject, as a student, professor or staff at the College of Pharmacy, University of Minnesota. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Erika Freitas, a PhD candidate at the Social and Administrative Pharmacy Program, University of Minnesota.

Background Information

The pedagogical processes through which students are supposed to become more reflective are an important issue in preparing critical thinkers in the healthcare field. The dynamics of knowledge production and acquisition is placing increasing demand on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems. The present qualitative study aims to assist in the unraveling the complex web of personal beliefs and cultural perspectives related to professional education and education ideologies which inform teaching-learning critical thinking skills in the pharmacy classroom nowadays.

Procedures:

If you agree to be in this study, I will email you the interview questions and I would appreciate if you could email your answers back to me within 1 month. I will ask you questions about your experiences in classroom related to teaching and learning critical thinking skills and abilities. Your name will never be associated with the information obtained.

Risks and Benefits of being in the Study

The risk of being in the study is that you might feel embarrassed when writing about your activities and experiences in the classroom and about your personal beliefs on education. If you feel any discomfort, you are free to refuse answering any interview questions.

There are no direct benefits to you as a participant in this study.

Compensation:

There are no costs involved in participating in this study. You will not be paid for your participation.

Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question, or withdraw at any time without affecting those relationships.

Contacts and Questions:

Erika Freitas is the researcher responsible for conducting this study. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact me at frei0185@umn.edu, 612 223 9947. You may also contact my advisor, Dr. Djenane Ramalho de Oliveira, at djenane.oliveira@gmail.com.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

CONSENT FORM – FOCUS GROUP

Why do I think the way I do? Troubling the concept of critical thinking in pharmacy's classroom

You are invited to be in a research study of how we teach and learn critical thinking skills and abilities in the classroom. You were selected as a possible participant because you are enrolled in a course where these skills and abilities are supposed to be used when professors teach and students learn how to provide optimum care to patients. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Erika Freitas, a PhD candidate at the Social and Administrative Pharmacy Program, University of Minnesota.

Background Information

The pedagogical processes through which students are supposed to become more reflective are an important issue in preparing critical thinkers in the healthcare field. The dynamics of knowledge production and acquisition is placing increasing demand on the ability to analyze information and integrate diverse sources of knowledge in solving complex problems. The present qualitative study aims to assist in the unraveling the complex web of personal beliefs and cultural perspectives related to professional education and education ideologies which inform teaching-learning critical thinking skills in the pharmacy classroom nowadays.

Procedures:

If you agree to be in this study, I will ask you to participate in one focus group for 1 – 1.5h in a place and time convenient to you and to the other participants. I will ask you questions about your experiences in classroom related to teaching and learning critical thinking skills and abilities. With your permission, the focus group will be audio taped. The tapes will be erased after the focus group is written down (transcribed) and your name will never be associated with the information obtained.

Risks and Benefits of being in the Study

The risk of being in the study is that you might feel embarrassed when talking about your activities and experiences in the classroom and about your personal beliefs on education. If you feel any discomfort, you are free to refuse to answer any question during the focus group.

There are no direct benefits to you as a participant in this study.

Compensation:

There are no costs involved in participating in this study. You will not be paid for your participation.

Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question, to refuse to be observed at any time, or withdraw at any time without affecting those relationships.

Contacts and Questions:

Erika Freitas is the researcher responsible for conducting this study. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Erika Freitas at frei0185@umn.edu, 612 223 9947. You may also contact her advisor, Dr. Djenane Ramalho de Oliveira, at djenane.oliveira@gmail.com, 612 860 1072.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

APPENDIX IV: Collaborative Analysis Excerpt A

INSTRUCTIONS: The following passage is an excerpt of a focus group conducted with PD1, PD2 and PD3 pharmacy students. Please read the passage below and answer the question posed at the end of the text.

[Male student 1]: And I think kind of the place to maximize critical thinking effectiveness would be in small groups like lab-sized [9-10 students], because when you get in that big room, then you've got the pressure of being wrong in front of everybody and you've always got the assumption that well, there's 119 other people in this room, somebody else will answer. I can keep quiet and let this one pass me by. If you're in a group this size or smaller [referring to the 11 people in the focus group], then I think you're a lot more engaged and you're going to participate in that critical thinking process. [0:53:00.6]

ERIKA: What do you guys think?

[Female student 1]: I totally agree.

[Female student 2]: Actually this morning, I'm in the geriatric elective and we have case discussions that are about this size [11 participants]. That's the first thing that came to my mind actually, and then Outcomes [Pharmacy Outcomes course]. But yeah, I totally agree with [Male student 1], like if it's in a smaller group, you're more likely to speak up, because you're sometimes also put on the spot too, like you're expected to eventually say something.

ERIKA: And did you mention Outcomes [referring to the course Pharmacy Outcomes]?

[Female student 2]: I would prefer a geriatric elective, smaller group discussion, case discussion, over an Outcomes class discussion, but I still think Outcomes would be still very helpful.

ERIKA: So what about outcomes?

[Female student 3] Outcomes is just like what [Male student 1] just said... Sometimes you feel like you don't necessarily have to say anything because someone else is going to say it.

[Female student 4] That's a bigger class, actually that's what it's like.

[Male student 1] I think Outcomes is a great class to kind of focus on that critical thinking, too. I think Outcomes would be a much better class if it was split into eight groups all semester.

[Female student 2] Definitely.

[Female student 4] And that's how the elective is, it's a bigger class.

[Male student 2] I still think that in Outcomes you get a lot more out of it than when you're just sitting in a lecture and not just them reading off their slides.

[Female student 3] Because they do challenge you.

[Male student 1] Outcomes is a great class.

[Male student 2] It's one of our better classes.

[Male student 1] But I think a lot of participation and that critical thinking process gets squashed by having 120 of us in one room.

[Male student 2] Right.

[Male student 3] Half the people are on Facebook.

FEMALE: That's what I was going to say, too. I think it makes a big difference if somebody is mediating the group discussion or if there's a teacher there, if you're expected to participate, because I think otherwise, a lot of people just sit back and let the more outspoken people run it, or people just don't care and they're just not engaged. So even though - I don't know, I just think it makes a big difference, like how it's set up and sort of the motivation of the individual group members.

I would like you to answer the following question:

- 1) What do you see in this excerpt that might be relevant in the context of pharmacy education? Feel free to comment on any issues you might have identified in this excerpt.

******THANK YOU FOR YOUR COLLABORATION!******

APPENDIX V: Collaborative Analysis Excerpt B

INSTRUCTIONS: The following passage is an excerpt of an interview conducted with a pharmacy professor, who also serves as a preceptor for 4th year pharmD students on rotations. Please read the passage below and answer the questions posed at the end of the text.

RESPONDENT: You know, we had Albert Wertheimer coming in. You've heard of Albert, right?

INTERVIEWER: Yes.

RESPONDENT: From your department [Social & Administrative Pharmacy]. You know, he came in saying that "We're not teaching the social stuff. There's other stuff going on out there and pricing and all this other pharmacy side that is not so, you know, lab bench science based." He was right. So we slid over that way a little bit, and then we had the others saying, "Well, we need to get the pharmacist thinking more like a physician. They've got to understand pathophysiology, and we've got to teach this all in the curriculum." Yup, so let's bring it back this way just a little bit more. And all of a sudden, the pharmaceuticals dudes and the med-chem [medicinal chemistry] dudes were all saying: "My God, these guys are threatening my territory! I'm going to lose my job if all we're going to show them is these things! So quick, I'll pull them more this way". And they're yelling and screaming "We can't stop teaching medicinal chemistry because here's why they need these things!" That all happened, and we had this pretty good balance going on because everybody was fighting for their positions. (Chuckling) I think that happened somewhat accidentally in some ways. Apparently we've lost that. I don't know, I think the balance was pretty good for a while there. I think right now, if we just did what we did, do what we did, it'd be just fine. Now, what exactly that does look at, at what the curriculum was in 1990s, I would say, early 2000s, I think it was pretty good. [00:34:10]

INTERVIEWER: And why did we lose it now?

RESPONDENT: I think it's kind of what I said. I think we started to teach a little less chemistry, a little less structure, a little less science.

INTERVIEWER: And why is that?

RESPONDENT: You know, you're over your 60 Minutes! [joke tone. Laughs]

INTERVIEWER: (Chuckling)

RESPONDENT: What a good reporter! [joke tone. Laughs.]

INTERVIEWER: (Chuckling)

RESPONDENT: Let me think for a moment, why is that.

INTERVIEWER: Yeah, sure, take your time.

[LONG PAUSE]

RESPONDENT: But I can't answer that properly! Why did we go one way?

INTERVIEWER: Yeah. Why are we leaning towards that direction now?

[LONG PAUSE]

RESPONDENT: I don't know. I've never assessed it. But my gut guess would tell me we hired a lot of practitioners in the college, a lot of scientists who, perhaps in their discipline, were more of the other persuasion, and pulled the curriculum their way. That's my gut.

INTERVIEWER: Um-hmm.

RESPONDENT: Is it bad? I'm not saying it's bad. But I don't know that we're getting an end product that is as good... I know - I can say this for fact from my experience, right? - My art tells me the students I've had in the last two to three years are not as good as the students I used to have. I can say that without a doubt, and because these guys all say the same thing [referring to his team, who are PharmD preceptors, too].

I would like you to answer the following question:

- 1) What do you see in this excerpt that might be relevant in the context of pharmacy education? Feel free to comment on any issues you might have identified in this excerpt.