



REFLECTIONS ON THE IMPORTANCE OF REFERENCE FOR CRITICAL THINKING

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Abstract

Reflection is a process which helps you gain insight into your professional practise by thinking analytically about any element of it. The insights developed, and lessons learned, can be applied to maintain good practice and can also lead to developments and improvements for both the professional and their service users. Different people learn in different ways and while one person may learn by reflecting on a positive outcome, another may find it most useful to focus on a situation they found challenging. It is important that reflection is done in the way that suits you best to provide the greatest benefit. A central objective of higher education is the development of critical-thinking skills and propensities. Within the health professions, the importance of critical thinking is clear: practitioners must make numerous complex decisions affecting patient care, frequently based upon incomplete or imperfect information. Thus, practitioners must be able to extrapolate, interpolate, and make reasoned, defensible judgments based upon the best available information.

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Introduction

Many definitions of critical thinking have been proposed. These definitions have in common several key attributes, including the strategic use of available resources; purposeful, outcome-oriented analysis that avoids personal biases; and the ability to examine a situation from multiple perspectives and integrate these in a systematic manner. Halpern's definition of critical thinking is perhaps most resonant with the goals of health professional education: "the deliberate use of cognitive skills and strategies that increase the probability of a desirable outcome in a given situation." Within health professions education, there have been attempts to introduce a culture of critical thinking. Examples of courses, assignments, or

learning opportunities purported to teach and assess critical thinking have been shared. This "show-and-tell" approach to critical thinking has been somewhat a theoretical and has not adequately addressed fundamental questions of how critical thinking develops, evolves, or may be nurtured. Lack of critical thinking – sometimes referred to as *flawed thinking*—is ubiquitous, even among educated individuals, including among health care professionals. Cognitive psychologists have argued as to whether this ubiquity indicates a *natural state*; that is, whether irrationality and flawed thinking are the norm, and critical thinking and reason are the exceptions. There is some evidence to suggest that critical thinking is a learned rather than natural behavior, and that most human beings are



cognitively predisposed to flawed thinking. In particular, cognitive psychologists have examined the use of reasoning *heuristics* as a clue to the internal mental processes that guide reasoning and decision making in ambiguous and uncertain situations.

Heuristics are the “rules of thumb” generated by each of us to guide judgment and decision making. They have been described as the specific rules governing individual thought and behavior derived from personal experience, and the process of gaining knowledge by intelligent guesswork rather than by pre-established formula or criteria. Heuristic reasoning is a shortcut thinking method that contrasts with algorithmic reasoning, which built upon clear rules in an environment of abundant, incontestable evidence. Heuristic reasoning is an essential cognitive strategy in day-to-day life since there are few situations that arise where clear rules exist and abundant and incontestable evidence is available. In time-pressured situations, heuristic reasoning is the dominant (and appropriate) mode of analysis and decision making. For example, when making decisions related to purchasing a piece of fruit, most individuals rely heavily upon superficial observations (eg, how the fruit looks, feels, and smells) that invoke heuristic reasoning. Algorithmic reasoning in this context would lead us to instead ask questions such as “How long ago was this fruit picked?” or “What length of time is required for shipping?” and “On average, what is the shelf-life of this kind of produce?”

In many low-stakes situations, such as day-to-day social interactions or decisions related to consumer purchases, heuristic reasoning generally serves us well enough. The cognitive energy and time required to engage in algorithmic (rule-based) reasoning for every little decision is not worth the potentially improved outcome in most cases. However, in many cases, particularly in a health care context, relying on the same heuristic reasoning patterns we use in our day-to-day

life may actually *increase* the risk of systematic errors, assumptions, biases, and flawed thinking.

Cognitive psychologists have identified a variety of seemingly natural-state flawed thinking strategies that form heuristic reasoning patterns in most people; these are described in Appendix 1. Though not a comprehensive inventory of all heuristics, these 6 fallacies have been identified as among the most common flawed thinking strategies in the population. The consequences of such flawed thinking can range from humorous to aggravating to downright dangerous. Within medical education and practice, recent attention has focused on the ways in which flawed thinking that flows from use of these heuristics can, for example, impair accurate and effective diagnosis when physicians utilize the *representativeness heuristic* (Appendix 1) and make biased or stereotyped assessments of patients.

Clearly, critical thinking is not like citizenship or blood typing; having passed a “test” of critical thinking neither guarantees nor predicts that an individual will avoid using heuristics in the next situation to arise. We hypothesize that a “missing link” in much of the critical thinking literature may be the role of self-assessment and reflection-in-action in helping individuals to identify situations in which heuristic reasoning is more efficient and sufficiently effective and those situations in which algorithmic reasoning should be employed to optimize outcomes. This hypothesis is built upon a belief (not empirically tested, but proposed in the literature) that self-assessment and reflection provides individuals with an opportunity to cognitively step outside of themselves and their immediate activity. This shift promotes realignment of goals, methods, objectives, and outcomes, and can therefore be used to shift from heuristic to critical thinking in the appropriate circumstance.



While there is literature regarding self-assessment, much of it has focused on tools used to facilitate or encourage this propensity. There is also literature related to reflection particularly in the health professions. For example, the concept of the “reflective practitioner,” a term first coined by Schonhas, now has become widely accepted in education. However, there is currently a paucity of literature linking these concepts, and little empirical evidence to suggest any association between them. Elucidating the connection between self-assessment, reflection, and critical thinking may provide educators and practitioners with a more sophisticated understanding of how problems with heuristic reasoning may be overcome. Thus, the primary objective of this study was to examine whether self-assessment and reflection-in-action improved critical thinking among pharmacy students. Critical thinking skills are perhaps the most fundamental skills involved in making judgments and solving problems. You use them every day, and you can continue improving them.

The ability to think critically about a matter—to analyze a question, situation, or problem down to its most basic parts—is what helps us evaluate the accuracy and truthfulness of statements, claims, and information we read and hear. It is the sharp knife that, when honed, separates fact from fiction, honesty from lies, and the accurate from the misleading. We all use this skill to one degree or another almost every day. For example, we use critical thinking every day as we consider the latest consumer products and why one particular product is the best among its peers.

The academic setting demands more of us in terms of critical thinking than everyday life. It demands that we evaluate information and analyze myriad issues. It is the environment where our critical thinking skills can be the difference between success and failure. In this environment we must consider information in an analytical, critical manner. It is only through purposeful, frequent, intentional questioning such as this that we can sharpen

our critical thinking skills and improve as students, learners and researchers.

Defining Critical Thinking

Thinking comes naturally. You don’t have to make it happen—it just does. But you can make it happen in different ways. For example, you can think positively or negatively. You can think with “heart” and you can think with rational judgment. You can also think strategically and analytically, and mathematically and scientifically. These are a few of multiple ways in which the mind can process thought.

What are some forms of thinking you use? When do you use them, and why?

As a college student, you are tasked with engaging and expanding your thinking skills. One of the most important of these skills is critical thinking. Critical thinking is important because it relates to nearly all tasks, situations, topics, careers, environments, challenges, and opportunities. It’s not restricted to a particular subject area.

Critical thinking is clear, reasonable, reflective thinking focused on deciding what to believe or do. It means asking probing questions like, “How do we know?” or “Is this true in every case or just in this instance?” It involves being skeptical and challenging assumptions, rather than simply memorizing facts or blindly accepting what you hear or read.

Imagine, for example, that you’re reading a history textbook. You wonder who wrote it and why, because you detect certain assumptions in the writing. You find that the author has a limited scope of research focused only on a particular group within a population. In this case, your critical thinking reveals that there are “other sides to the story.”

Who are critical thinkers, and what characteristics do they have in common? Critical thinkers are usually curious and reflective people. They like to explore and probe new areas and seek knowledge,



clarification, and new solutions. They ask pertinent questions, evaluate statements and arguments, and they distinguish between facts and opinion. They are also willing to examine their own beliefs, possessing a manner of humility that allows them to admit lack of knowledge or understanding when needed. They are open to changing their mind. Perhaps most of all, they actively enjoy learning, and seeking new knowledge is a lifelong pursuit.

Critical Thinking and Logic

Critical thinking is fundamentally a process of questioning information and data. You may question the information you read in a textbook, or you may question what a politician or a professor or a classmate says. You can also question a commonly-held belief or a new idea. With critical thinking, anything and everything is subject to question and examination.

Logic's Relationship to Critical Thinking

The word **logic** comes from the Ancient Greek *logike*, referring to the science or art of reasoning. Using logic, a person evaluates arguments and strives to distinguish between good and bad reasoning, or between truth and falsehood. Using logic, you can evaluate ideas or claims people make, make good decisions, and form sound beliefs about the world.^[1]

Questions of Logic in Critical Thinking

Let's use a simple example of applying logic to a critical-thinking situation. In this hypothetical scenario, a man has a PhD in political science, and he works as a professor at a local college. His wife works at the college, too. They have three young children in the local school system, and their family is well known in the community.

The man is now running for political office. Are his credentials and experience sufficient for entering public office? Will he be effective in the political office? Some voters might believe that his personal life and current job,

on the surface, suggest he will do well in the position, and they will vote for him.

In truth, the characteristics described don't guarantee that the man will do a good job. The information is somewhat irrelevant. What else might you want to know? How about whether the man had already held a political office and done a good job? In this case, we want to ask, How much information is adequate in order to make a decision based on logic instead of assumptions?

The following questions, presented in Figure 1, below, are ones you may apply to formulating a logical, reasoned perspective in the above scenario or any other situation:

1. **What's happening?** Gather the basic information and begin to think of questions.
2. **Why is it important?** Ask yourself why it's significant and whether or not you agree.
3. **What don't I see?** Is there anything important missing?
4. **How do I know?** Ask yourself where the information came from and how it was constructed.
5. **Who is saying it?** What's the position of the speaker and what is influencing them?
6. **What else? What if?** What other ideas exist and are there other possibilities?

The ability for one to think critically is an essential skill in today's classroom and workplace as it is fundamental for students to examine a problem through an objective lens (Halpern, 1993). Generally, critical thinking is defined as synthesizing and analyzing evidence to make a conclusion on a topic (Williams & Stockdale, 2003). Critical thinking skills can be used to interpret what is occurring in the environment; to analyze and evaluate a claim; to separate fact from opinion; and to provide solid evidence for an argument (Facione, 2011). Within the classroom, critical thinking occurs when students are presented with a problem (e.g., case study), and they assess possible solutions within the context and use evidence to



support the chosen solution. By improving critical thinking skills, students are better equipped to handle problems where solutions are unclear or no rote-memorized solution is possible (i.e., illstructured problems). Critical thinking skills appear to be more important today than ever before due to the fastpaced workplace and constantly evolving technologies (Lambert & Cuper, 2008). One has to be able to analyze and integrate information efficiently and effectively in order to know what information is valid and useful. For example, when emerging technologies present learners with the challenge of being overloaded with information, critical thinking skills can be applied to quickly and adequately evaluate the content's worth in relation to the particular situation (Halpern, 1999).

Even though some believe strong critical thinking skills are more important than ever to acquire (Hart, 2013; Sternberg, 2013), critical thinking is not a new phenomenon. In 1956, Bloom suggested that synthesis through critical thinking is a complex behavior within the taxonomy of learning. Critical thinking is a complex behavior as it requires the learner to generate ideas, apply past information, make judgments on an idea or explain why or how something occurs, and/or provide evidence for why the current solution was chosen (See Figure 1.1). For instance, when students solve case studies, they are utilizing their critical thinking skills to consider multiple aspects of the issue before offering a solution. 2 Figure 1.1 Model of Iterative Critical Thinking Process While Bloom's taxonomy of learning has been widely accepted for decades, most instructors find that critical thinking is a difficult strategy to promote within the classroom (Paul, Elder, & Bartell, 1997). According to 99% of the higher education faculty who responded to a survey by Arum and Roksa (2010), critical thinking is ranked as a very important or essential outcome of college. Yet, a recent report suggested that when measuring the change in critical thinking after four years in college, less than 30% of college seniors reported increases in their critical thinking

skills (Arum & Roska, 2010). This indicates that instructors understand the value of critical thinking skills but are unclear how to foster these skills within the classroom.

One reason why this percentage of reported increase in critical thinking is so low is because humans are not born as natural critical thinkers; instead, critical thinking is a skill set acquired through practice and feedback (Shermer, 2002). Shermer describes humans as pattern seekers and storytellers, rather than natural critical thinkers who have to put abstract details together to form conclusions. The challenge for instructors is to help learners think abstractly or "outside of the box" instead of following a set of patterned behaviors or instructions. While critical thinking may not be easy to promote, higher education is an ideal environment to foster such skills (Halpern, 1999). Not only does the college environment allow for learners to think freely without restraint of standardized testing, the workforce requires and expects college graduates to be equipped with strong critical thinking skills. Additionally, learners who have high critical thinking skills secure jobs more quickly (Partnership for 21st Century Skills) and are more prepared for the workforce (Halpern, 1999) than those with low 3 critical thinking skills. One significant effort being implemented in the classroom to encourage students' critical thinking is the use of their natural story-telling tendencies through personal reflection (Shermer, 2002). Reflecting on the course content offers students opportunities to connect past experiences with current learning material thus helping them to become active participants and learners.

Active learning enhances the learning experience as it enables participants to make connections to the information being taught and motivates them to want to learn the content (Driscoll, 2005). There are several benefits of using reflection techniques in the classroom. Schiller (2009) proposes that internal reflection adds to an engaging,



effective external delivery of the new material, which helps the learner want to participate in the activity. Conrad and Donaldson (2004) suggest that reflection is an important component for self-empowerment when the learner claims an active role. Along with enhancing the learning experience, reflection helps students process the information resulting in an increase in comprehension and retention skills (Stansfield, McLellan, & Connelly, 2004). While there are benefits to including reflection in the classroom, there is conflicting literature on how to set up environments for optimal reflection. The research supports both individual and group reflection; however, it does not offer solid support for which environmental strategy is more effective than the other. Some researchers provide evidence that reflection is an individual activity and only personal reflection can lead to increases in knowledge (McGuire, Lay, & Peters, 2009; Smith, 2011). Individual reflection calls for participants to think back on their personal prior experiences and connect those experiences to current information (Heron, 1985).

Individual reflection through writing activities offers the most potential for increasing critical thinking skills when comparing individual, group, and whole class activities (Wang, Whoo, & Zhao, 2009). Furthermore, individual reflection allows the user to tap into their individual emotions in a safe environment to gain a deeper learning (Chandler, 2004). This is important because it allows learners to feel confident to attempt new skills and think through all options, without chance of ridicule. Meanwhile, other researchers have found that collaborative reflection enables participants to learn from different perspectives while gaining a deeper understanding of the content being taught (Gokhale, 1995; Pollock, Hamann, & Wilson, 2011). Group reflection is similar to individual reflection in that individuals rely on past experience and prior knowledge of the topic; however, group reflection differs in that

group activities provide opportunities for synergy through participants sharing ideas (Yukawa, 2006). Synergy is important because it promotes positive energy towards the activity as participants share ideas and experiences.

By its nature, collaboration contains a level of reflection embedded within its process. For example, as learners share ideas and experiences, other group members gain knowledge of each other's perspectives and have the opportunity to internalize their own thoughts and opinions as they mentally process their group members' experiences. Reflection can also be used in solving ill-structured problems. Ill-structured problems are open-ended and do not include many details. For instance, an ill-structured problem could be a scenario that may be solved multiple ways as long as it is accompanied by supporting evidence rather than just one answer that the student is trying to memorize to answer correctly. ReiterPalmon, Illies, Cross, Buboltz, and Nimps (2009) found that students used individual reflection to solve ill-structured case studies and successfully transferred prior problem solving skills when the case studies were a similar level of complexity. Similarly, Gokhale (1995) found that participants within small groups used reflection among members to solve ill-structured problems and provided an environment where learners could share ideas and further understand the topic.

Conclusion

Throughout this literature review, evidence has been presented illustrating the need for critical thinking skills to be enhanced in higher education (Pascarella, 1989; Pascarella et al., 1996). Although those studies are important, simply attending college classes may not necessarily result in students improving their critical thinking skills. Intentional implementation of reflection activities is needed to improve students' critical thinking skills so they may be prepared to meet future workforce demands (Brock, 2010; Delany &



Watkin, 2009; Geertsen, 2003). Through reflection, individuals can learn more about themselves, become aware of gaps in their own knowledge, and develop deeper knowledge of content areas. Several researchers have used individual journal submissions as a reflective activity to help learners become more aware of their thoughts' progression over time (McGuire et al, 2009; Surbeck et al., 1991). Others have implemented group discussions as a way for learners to hear and learn from their peers (Pollock et al., 2011). Throughout both individual and group reflective activities, the participant becomes an active learner; however, it is not clear whether individual learning or collaborative learning is more likely to increase learners' critical thinking skills.

References

1. Cruickshank, D.R. (1987) *Reflective Teaching. The Preparation Of Students Of Teaching* (Reston, Va, Association Of Teacher Education).
2. Damasio, A.R. (1994) *Descartes' Error: Emotion, Reason And The Human Brain* (New York, Grosset/Putnam).
3. Edwards, B. (1979) *Drawing On The Right Side Of The Brain* (Los Angeles, J.P. Tarcher). Fodor, J.A. (1975) *The Language Of Thought* (Cambridge, Ma, Harvard University Press). Gelter, H. (2003) How Can We Improve Our Understanding of Reflection In Learning? (In Press).
4. Ghaye, T. & Lillyman, S. (2000) *Reflection: Principles And Practice For Healthcare Professionals* (Wiltshire, Quay Books).
5. Grimmer, P.P. & Erickson, G.L. (1988) *Reflection In Teacher Education* (New York, Teacher College Press).
6. Henderson, J.G. (1992) *Reflective Teaching: Becoming An Inquiring Educator* (New York, Maxwell Macmillan).
7. Jaynes, J. (1976) *The Origin Of Consciousness In The Breakdown Of The Bicameral Mind* (Boston, Houghton Mifflin).
8. Kolb, D.A. (1984) *Experiential Learning. Experience As The Source Of Learning And Development* (New Jersey, Prince Hall).
9. Nørretranders, T. (1996) *Märk Vä Rlden. En Bok Om Vetenskap Och Intuition (Mark The World: A Book About Science And Intuition)* (Stockholm, Mån-pocket).
10. Pollard, A. & Tann, S. (1987) *Reflective Teaching In The Primary School. A Handbook For The Classroom* (London, Cassell).
11. Posner, G.J. (1985) *Field Experience: A Guide To Reflective Teaching* (New York, Longman).
12. Reason, P. & Bradbury, H. (2001) *Handbook of Action Research, Participatory Inquiry & Practice* (London, Sage Publications).
13. Ross, D., Doerre, B.E. & Kyle, D.W. (1993) *Reflective Teaching For Student Empowerment. Elementary Curriculum And Methods* (New York, Macmillan).
14. Russell, T. & Munby, H. (1992) *Teachers And Teaching. From Classroom To Reflection* (London, The Falmer Press).
15. Schön, D. (1987) *Educating The Reflective Practitioner: Towards A New Design For Teaching And Learning In The Professions* (San Francisco, Jossey-Bass).
16. Sejnowski, T.J., Koch, C. & Churchland, P.A. (1988) Computational Neuroscience, *Science*, 241, Pp. 1299–1306.

