Journal of the Scholarship of Teaching and Learning, Vol. 22, No. 1, March 2022, pp.154-171.
doi: 10.14434/josotl.v22i1.30983

Critical Thinking: Two Theses from the Ground Up

Z Zhou
National University of Singapore

Abstract: This paper analyses a set of widely held beliefs concerning our understanding and teaching of critical thinking, a notion which is increasingly adopted by universities as their main educational goal. Existing scholarship on critical thinking throws up a vast heterogeneous collection of definitions of critical thinking. I propose a 'meta-definition' of critical thinking—or, what I call the cluster concept of critical thinking—to show that there is unity in an otherwise messy conceptual terrain. A second aim of this paper is to offer a plea for the intellectual virtues in general and that of humility in particular as means of fostering critical thinking. This paper concludes by presenting a series of pedagogical implications for instructors in tertiary education in the business of designing modules that aim to promote critical thinking.
Keywords: theories of critical thinking, higher education, module design, intellectual virtues.

In the opening paragraph of his famous treatise on education, *How We Think*, John Dewey speaks of the activity that he calls 'reflective thinking', or what is known to us by the more familiar term 'critical thinking':

> *No one can tell another person in any definite way how he should think*, any more than how he ought to breathe to have his blood circulate. But the various ways in which men do think can be told and described in their general features. Some of these ways are better than others… the better way of thinking that is to be considered in this book is called reflective thinking: the kind of thinking that consists in turning a subject over in the mind and giving it serious and consecutive consideration. (1933, p. 3, my emphasis)

Most readers of this passage immediately notice the first line where Dewey provocatively warns: 'No one can tell another person… how he should think'—the sentiment expressed here is striking given the fact that many educational institutions these days have adopted the fostering of 'critical thinking' as a central goal of education. Relatedly, many introductory undergraduate syllabi have as one of their key learning objectives that students develop their critical thinking skills or be able to evaluate or hold discussions of topics or issues 'critically'. Textbooks have been written solely devoted to the teaching of critical thinking. Indeed, entire psychometric tests have been developed—most famously by Ennis—to determine an individual's level of critical thinking skills. There is, however, some wisdom in Dewey's cautionary words: for, the *teaching* of critical thinking, which this paper is about, is not without its difficulties.

The interest that surrounds the notion of critical thinking and the expanding research that such an interest has given rise to have stirred a fair amount of controversy. The critical thinking movement has, for instance, been criticized for valuing thought over action (Martin 1992), for valuing verbal forms of communication over non-verbal forms (Alston 2001), and for promoting a false sense of reasonableness or objectivity that fails to be sensitive to the highly contextualized circumstances that individuals find themselves in (Thayer-Bacon 1995). This paper attempts to lay some groundwork upon which instructors designing modules on critical thinking or modules with a major critical thinking component can draw from. By critically reviewing what notable scholars in the field have said about critical thinking, this paper argues for two theses. First, that the notion of critical thinking is what I call a 'cluster concept': of all the critical thinking qualities that one can list down, there are a great many proper subsets of or clusters within this list that specify the tools for epistemic or practical

excellence for any given discipline or domain of inquiry. The second thesis offered in this paper is that the intellectual virtues in general or that of intellectual humility in particular is an integral character disposition of the critical thinker. This paper concludes by offering a series of pedagogical implications for instructors designing a college course in critical thinking.

1. Thesis #1: 'Critical Thinking' as a Cluster Concept

Some scholars writing on the subject tend to see themselves as *defining* the concept of critical thinking,[1] where such definitions (as 'definitions' go) are attempts at describing in a concise and insightful manner what critical thinking is. Yet, to attempt a definition of critical thinking is to assume that the very concept itself enjoys some degree of internal coherence or consistency. But, there are many definitions of 'critical thinking' not all of which form a coherent or consistent whole. The task of this section is to propose a 'meta-definition' of critical thinking—a definition about definitions of critical thinking—to account for an otherwise heterogeneous conceptual terrain. Any given discipline (or subject) or domain of inquiry (e.g. legal analysis) would tend to have its own set of critical thinking tools which are instrumental for achieving epistemic or practical excellence in that discipline or domain of inquiry. Since the content, methodologies and research goals of disciplines and domains of inquiry tend to differ, there is no one unique set of knowledge, skills or dispositions sufficient for excellence across all disciplines and domains of inquiry. Instead, the concept of critical thinking should be best thought of as a 'cluster' concept that specifies a long list of knowledge, skills and dispositions, no one of which is necessary for excellence in a discipline or domain of inquiry, but at least one proper subset of which is sufficient for excellence.[2] Further, the closer the content, methodologies and research goals are of any two disciplines or domains of inquiry, the more likely it is that they will have an overlapping set of critical thinking qualities.

A preliminary indication that the concept of critical thinking is a cluster concept is that many definitions or conceptions of critical thinking take the form of a *list* of knowledge, skills or dispositions, where there is a lack of a principle that explains what goes next in the list. Such definitions of critical thinking are, thus, akin to definitions that are enumerative in nature such as the following: 'Colour is that which is either blue, red, green or…'. Contrast such a list-like 'definition' of colour with one that is *constitutive* in nature: 'Colour is the visual perception of light reflected by objects and differentiated by hue, darkness and saturation'. The fact that most definitions or conceptions of critical thinking are enumerative or list-like as opposed to constitutive in nature is an indication that critical thinking is a concept too diverse to admit of non-arbitrary unification, and that any given list of critical thinking qualities is likely to be incomplete and different from another. Another preliminary indication that the concept of critical thinking is a cluster concept is that some authors do not appear to think that the definition of critical thinking that they are advocating is exhaustive or not open to additions or deletions (although they may not be explicit in saying so).

A more concrete indication that the concept of critical thinking is a cluster concept is this. Consider the following widely circulated definition of critical thinking from Paul and Elder (2015; also quoted in numerous places, e.g. Heft and Scharff 2017, p. 50):

[1] As Halpern writes: 'Although many psychologists and others have proposed definitions for the term 'critical thinking', these definitions tend to be similar in content" (2003, p. 6). In a similar vein, Robinson writes '[d]iscussions of critical thinking owe much to *definitions* devised by philosophers…' (2011, p. 275).

[2] I am influenced by a theory (of a similar name) that some philosophers have said about the definition of art (see. Gaut 2000).

> That mode of thinking—about any subject, content, or problem—in which the thinker improves the quality of his or her thinking by skilfully analysing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities, as well as a commitment to overcome our native egocentrism and sociocentrism.

Now contrast the above definition with that offered by another notable scholar in the field:

> Critical thinking is the propensity and skill to engage in an activity with reflective scepticism. (McPeck 1981, p. 7; see also McPeck 1984, 1985, 1990)
> [Critical thinking involves] an understanding of the subject matter they are thinking about. (McPeck 1981, p. 7)

McPeck's definitions appear to be more modest than the one offered to us by Paul and Elder: while McPeck speaks of critical thinking as involving a state of scepticism and an understanding of some subject matter, Paul and Elder see critical thinking as involving a continued (perhaps life-long) process of self-improvement, a reflective endorsement of certain 'standards of excellence', problem-solving abilities and those of effective communication, and a disposition against epistemic parochialism. Are McPeck's definitions, then, too permissive while that by Paul and Elder too demanding? I wish to argue that this is not the case. For, consider the concept of 'hygiene': while a pair of hands that has been washed might be considered to be sufficiently hygienic for the purpose of having a meal, the same pair of hands would not be sufficiently hygienic for the purpose of conducting medical surgery. The claim being offered here is this: what the 'correct' definition of critical thinking is depends on the discipline or domain of inquiry; and, the 'correct' definition of critical thinking to adopt for the purpose of module design depends on how appropriate the tool is for achieving success in that discipline or domain of inquiry. While McPeck's definitions might suffice for a high school student taking an introductory course on the history of the Second World War, the definition by Paul and Elder appears to be describing the criteria of the critical *person* with stable and long-term psychological dispositions for general multi-disciplinary excellence.

Many commentators have noted, rightly I think, that critical thinking is manifested differently in different disciplines (Nicholas and Raider-Roth 2016; Thonney and Montgomery 2019). For instance, while critical thinking in a philosophy module might require students to be familiar with propositional and predicate logic, critical thinking in a psychology module might require knowledge of certain socio-scientific methods of data collection and statistical analysis (Nicholas and Raider-Roth 2016).[3] Similarly, while theoretical simplicity and elegance may be criteria relevant to the formulation of a cosmological theory by a physicist, these criteria may not be relevant to a biologist's search for a vaccine against the avian flu. Critical thinking manifests itself differently in different disciplines because the content, methodology and research goals differ across different disciplines and domains; as a result, the *means* of arriving at answers to those questions need to be appropriate to the task at hand. And to think critically in any given discipline or domain of inquiry is to exercise the knowledge, skills and dispositions characteristic of achieving epistemic and practical success in that given field or practice.

[3] Indeed, even within a discipline of scholars (e.g. psychology), there are doubtless numerous communities and methods that are continuously being adopted, revised or even disposed of. And even within a specific disciplinary community, different research questions call for different investigatory methodologies that are adopted for the task.

To appreciate the foregoing claim, consider the following data taken from Nicholas and Raider-Roth (2016) which I summarised in table form:

Table 1. Critical Thinking Qualities.

Discipline or Disciplinary Field	**Philosophy**	**Humanities**	**Natural Sciences**	**Social Sciences**
Skills, abilities, bodies of knowledge and dispositions of character associated with the discipline or disciplinary field in question	Formal Logic	Questioning	Problem solving	Problem solving
	Validity and soundness	Considering multiple perspectives	Decision making	Decision making
	Mathematical validity	Exploring the past	Rational thinking	Testing hypothesis
	Questioning	Qualifying or seeing difference	Synthesis of knowledge	Inquisitiveness
	Marking distinctions	Seeing nuances in opinion	Logical reasoning	Statistical validity
	Comprehend, articulate, analyse arguments	Marking distinctions	Making reasonable assumptions	
		Summarising	Testing hypothesis	
		Wondering	Statistical validity	
		Multiple frames of mind		

The table makes explicit what we already suspect to be the case, namely that that the skills, abilities, bodies of knowledge and dispositions of character differ amongst disciplines or disciplinary fields. As suggested above, I believe that such diversity exists because different disciplines or domains of inquiry have different content, methods and research goals; as a result, the means of achieving excellence across them differ. The notion of critical thinking, to draw from a famous thesis by the famous philosopher Ludwig Wittgenstein (1953), defies essentialistic definitions that betray the theorizer's 'craving for generality'; instead, the idea of 'family resemblance' offers us a more accurate understanding of the notion of critical thinking: just as I bear more resemblance to my father than I do my grandfather, what counts as critical thinking in the discipline of literary analysis bears more resemblance to that of history than it does chemistry. The concept of 'critical thinking' is conceptualised differently across disciplines or domains of inquiry; there is no reason to look for one unique set of knowledge, skills and dispositions to understand all of critical thinking. We should, instead, be open to 'a complicated network of similarities overlapping and criss-crossing' when we theorise about critical thinking.

As a means of laying out what I call the cluster theory of critical thinking, it bears noticing that the table above showcases a tendency amongst writers to *collapse different kinds of qualities* associated with the concept of critical thinking; these when properly separated might look as follows:

Know-thats (x-s)—also known as subject-specific content or knowledge—e.g. the theory of evolution;
Know-hows (y-s)—also known as 'abilities' (Glaser 1941), 'skills' (Facione 1990; Halpern 1998) or 'competencies' (Fisher and Scriven 1997)—e.g. summarising;
Dispositions or habits of character (z-s), e.g. inquisitiveness.

The cluster theory of critical thinking posits that there is a *long* list of critical thinking qualities that draw from these three categories above, i.e. x1, x2, x3…y1, y2, y3… z1, z2, z3…, about which the following hypotheses are true: first, it may be that no single quality is necessary for epistemic or practical success in *every* discipline or domain of inquiry;[4] second, a proper subset of the (master) list is sufficient for epistemic or practical success in a discipline or domain of inquiry; third, and finally, the closer any two disciplines or domains of inquiry are with respect to their content, methodology and research goals, the more likely it is that their critical thinking qualities will overlap. The pedagogical implications of this thesis will be described in a later section.

2. Thesis #2: Intellectual Virtues are Essential to Critical Thinking

A glance at the many definitional projects of critical thinking indicates the presence of a widely-shared assumption—namely, that critical thinking is a pre-dominantly 'rational' or 'cognitive' process very often associated with *mental* activities such as those of reflection, evaluation or analysis (King, Wood and Mines 1990; Piergiovanni 2014; Thonney and Montgomery 2019; Norris and Ennis 1989);[5] and, relatedly, the *mental* stamina to engage in such reflection or analysis over sustained periods of time is a hallmark of the 'serious' critical *thinker* (Nardone and Lee 2010). A related widely shared assumption amongst scholars of critical thinking is that a goal of reflection, questioning or evaluation is to assess the truth or reliability of a claim, argument or set of data (Moore 2013). And, the more *systematic* the process of reflection or questioning, the more critical thinking is said to be instantiated (Piergiovanni 2014). Consider also the following definitions of critical thinking:

> What can the strong critical thinkers do (what *mental* abilities do they have), that the weak critical thinkers have trouble doing?... As to the *cognitive* skills here is what the experts include as being at the very core of critical thinking: interpretation, analysis, evaluation, inference, explanation, and self-regulation. (Facione 2013, pp. 4 – 5, my emphasis)

> [A] purposeful, self-regulatory *judgment* which results in interpretation, analysis, evaluation and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that *judgment* is based. (The American Philosophical Association Delphi Committee 1990, quoted in Lorencová et. al. 2019, p. 844, my emphasis)

> As a sub-field of logic, critical thinking is described a form of *reasoning* that is focused on testing the validity of premises and the relationship between premises and conclusions. (Hammer and Green 2011, p. 304, my emphasis)

[4] Unless, of course, the quality in question is defined so *broadly* as to be uninteresting, e.g. 'analysing evidence'.
[5] Relatedly, critical thinking has been associated with further mentalese such as 'clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness' (Paul 1995; Paul and Elder 2001).

Most telling of all definitions that showcases what one might call the 'cognitivist' predilection is seen in the following passage:

> Critical thinking is the use of those *cognitive skills or strategies* that increase the probability of a positive outcome. It is used to describe thinking that is purposeful, reasoned, ands goal directed—the kind of thinking involved in *problem solving*, *formulating inferences*, *calculating likelihoods*, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task. (Halpern 2003, 6, my emphasis)

The cognitivist predilection—which gives pride of place to evidential reasoning and problem-solving—is evident in much academic discussion concerning the nature of critical thinking. To be sure, this has not gone unnoticed (see Thayer-Bacon 2000). But what has gone unnoticed by commentators is that the cognitivist predilection is in tension with a set of dispositions or epistemic habits often lauded by scholars. To appreciate this, let us recall the widely circulated definition of critical thinking from Paul and Elder that we saw earlier:

> That mode of thinking—about any subject, content, or problem—in which the thinker improves the quality of his or her thinking by skilfully analysing, assessing, and reconstructing it. *Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking*. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities, as well as a commitment *to overcome our native egocentrism and sociocentrism* (quoted in Heft and Scharff, 2017, p. 30, my emphasis)

Notice that the terms in italics are neither knowledge-hows (skills) nor knowledge-thats (knowledge of some proposition); rather, the terms refer to psychological *dispositions* or *habits* of character—this describes not so much the activities engaged in by a critical thinker as what this critical thinker is *habituated* or *psychologically disposed* to so. This echoes part of Facione's own conception of critical thinking, namely as a process involving 'purposeful, *self-regulated* judgment' (2020, p. 27 my emphasis). That critical thinking demands nothing less than a fine-tuning of one's psychological dispositions is a claim that has also been asserted by numerous other scholars (see Nardone and Lee 2010; Lloyd and Bahr 2010; Thonney and Montgomery 2019). Broadbear captures the idea emphatically when he writes, 'Whatever form of assessment is employed it is important to remember the ultimate goal of critical thinking–for the student to take charge of his/her own thinking thereby becoming *self-reliant* and *self-correcting*' (2003, p. 8, my emphasis). Critical thinking fosters a disposition towards scepticism or 'to be *permanently* cautious about accepting the judgments and ideas of other' (Moore 2013, p. 512, my emphasis).

The tension that I alluded to above, then, can now be stated more explicitly: if critical thinking involves the cultivation of certain psychological dispositions or habits of character, then the cognitivist predilection—that downplays or ignores the role of the emotions and intellectual virtues—may be the hidden dry rot that eats into any robust attempt at fostering critical thinking. Certain human emotions and intellectual virtues, as I intend to argue below, have an ineradicable role to play in our rational cognitive processes; so, the development of these emotions and intellectual virtues is fully in keeping with the pedagogical aim of fostering critical thinking.[6]

[6] There may be historical reasons why the human emotions have been overlooked in much academic discussion of critical thinking. For, historically, the emotions are thought to undermine critical thinking or (to use an older piece of terminology)

Recall a part of the definition of critical thinking offered by Paul and Elder; namely, that critical thinking involves, amongst other things, 'a commitment *to overcome our native egocentrism and sociocentrism'*. This part of the authors's definition, while commonly cited, has not received much discussion. I want to argue in what remains of this section that what Paul and Elder have in mind—i.e. of a commitment to overcome one's egocentrism and sociocentrism—comes very close to what psychologists call the positive emotion of humility. If this is right, then the critical thinker is, amongst other things, also one who possesses *intellectual humility* which is the *epistemic* analogue of the positive emotion of humility:

> The celebrated psychologist June Tangney defines the positive emotion of humility as follows: A person who has gained a sense of humility is no longer phenomenologically at the centre of his or her world. The focus is on the larger community, of which he or she is one part…. Our attention shifts outward, and our eyes are opened to the beauty and potential in those around us. (2002, pp. 412 – 413)

Tangney argues that humility dilutes tendencies toward egocentric self-enhancement, and that persons who possess humility are less defensive toward the opinions of others and more willing to consider differing views. This echoes Paul and Elder's characterisation of the critical thinker as one who bears a 'a commitment to overcome our native egocentrism and sociocentrism' as it does Broadbear's claim that critical thinking involves, amongst other things, a tendency to be receptive of the opinions of others (2003). Tangney sums up her research by offering the following descriptions of the characteristics of a person who possesses humility (2002, p. 413):

> an accurate assessment of one's abilities and achievements (*not* low self-esteem, self-deprecation);
> an ability to acknowledge one's mistakes, imperfections, gaps in knowledge, and limitations (often vis-a-vis a 'higher power');
> openness to new ideas, contradictory information, and advice;
> keeping one's abilities and accomplishments—one's place in the world—in perspective (e.g., seeing oneself as just one person in the larger scheme of things);
> a relatively low self-focus, a 'forgetting of the self', while recognizing that one is but part of the larger universe;
> an appreciation of the value of all things, as well as the many different ways that people and things can contribute to our world.

But, critical thinking is an *epistemic* process or tool, which has to do with the pursuit of *knowledge*. So, even though the foregoing discussion of the positive emotion of humility is not entirely relevant to our present topic on critical thinking it remains instructive—for, it points us towards the *epistemic*

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one's 'faculty of reason'. The Greek philosopher Plato in *The Republic*, for instance, argued that poets ought to be banished from the Greek city-state because poetry stirs the emotions which constitute a part of us that is inferior to our more rational souls. The German Enlightenment philosopher Immanuel Kant wrote the following provocative lines about the emotions: 'To be subject to affects and passions is probably always an *illness of the mind*, because both affect and passion shut out the sovereignty of reason' (2006, p. 149, emphasis in original). Closer to our time, the pragmatist thinker William James (1884, pp. 189 – 190)—whose writings have had profound influence on John Dewey—asserts that what we call the emotions are largely reducible to (mere) physiological states, and these emotions occur in us as sudden involuntary reactions to our rational perceptions (e.g. a belief that one is angry). Our brief historical detour suggests that current research into critical thinking might have inherited an intellectual tradition in which the emotions are viewed as poisons of one's rational cognitive faculties. Critical thinking, according to this tradition, is a strictly dispassionate process cruising on a separate channel from that of one's emotions or epistemic virtues.

analogue of emotional humility which is intellectual humility. To be sure, the intellectual virtues are various in kind (e.g. intellectual firmness, rigour, generosity, inquisitiveness), and such virtues about are significant epistemic aspects of human lives for which these virtues offer the basis of excellence. I will limit my discussion to the virtue of intellectual humility, which Pritchard defines as follows:

> I claim that what is key here is that humility, and thus intellectual humility, is an essentially *other*-regarding virtue. What I mean by this is that humility involves the essentially other-directed dispositions of, for example, respecting other people's abilities and achievements, being genuinely open to criticism of one's actions, being willing to respectfully listen to other people's opinions, and so on…. intellectual humility will involve the intellectual equivalents of these characteristically other-regarding dispositions, such as being open to points of view different from one's own, being willing to change one's mind if necessary, being willing to further reflect on the soundness of one's beliefs if called upon to do so, and so on. (2020, p. 403, emphasis in original).

While traditional conceptions of humility emphasize an individual's having a correct assessment of her strengths and weaknesses, the novelty of Pritchard's definition is that it casts the intellectually humble person as one who has *other*-regarding dispositions, i.e. sympathetic towards, if not deeply interested in, the perspectives or value-systems of other persons, and disposed towards engaging with others as a means of bettering oneself epistemically. Clearly, if popular conceptions of critical thinking involve a cultivation of the intellectual virtue of humility, then Pritchard's definition—as an other-regarding disposition—will have important ramifications for how instructors teach critical thinking. But more on this later.

In this section I suggested that what I call the cognitivist predilection may have resulted in little attention being given to the emotions and, relatedly, the intellectual virtues in critical thinking scholarship. Indeed, although some authors such as Paul and Elder have gestured towards the intellectual virtues, little by way of the pedagogical implications of these virtues have been systematically proposed. In what remains of this paper, I turn to the practical task of explaining how it is that a designer of a critical thinking module or a module with a major critical thinking component can do in light of the two theses I have forwarded.

3. Putting it All Together: How to Design a Module that Fosters Critical Thinking

Throughout this paper, I have argued for the following two theses:

> (1) The notion of 'critical thinking' is a cluster concept that posits a long list of critical thinking qualities that draw from the three categories of content (know-thats), skills (know-hows) and dispositions about which the following hypotheses are true: first, it is may be that no single quality is necessary for epistemic or practical success in every discipline or domain of inquiry; second, a proper subset of the list is sufficient for epistemic or practical success in a discipline or domain of inquiry; third, and finally, the closer any two disciplines or domains of inquiry are with respect to their content, methodology and research goals, the more likely it is that their critical thinking qualities will overlap.
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> (2) Epistemic dispositions of character also known as the intellectual virtues are integral to the successful critical thinker—they motivate students to be more receptive of the

> perspectives of others. As a result, critical thinking modules ought to foster the virtues of intellectual humility, firmness, rigour, generosity, inquisitiveness, and so forth.

In what follows, I will be making several recommendations for instructors designing or teaching a course in critical thinking (or a course with a major critical thinking component). And, I will do so in light the two theses I argued for above.[7]

1) *Two types of critical thinking modules: 'infusion' over 'stand-alone' model.* It is not uncommon to see instructors reaching out for the following usual-suspect syllabus when designing a course on critical thinking:

> Identification of arguments and their structure (e.g. distinguish premises from conclusions, understanding what modus ponens/tollens is);
> Assessing arguments for deductive validity and soundness, and inductive strength and cogency;
> Recognizing common informal fallacies in reasoning (e.g. ad hominem, begging the question, red herring).

The first problem with the usual-suspect syllabus is that the critical thinking qualities taught (e.g. knowledge of deductive validity) may *not* be necessary for epistemic or practical success in most disciplines or domains of inquiry. In other words, not all disciplines or domains of inquiry need involve for their success 'thinking that is used to critique arguments, offer justifications, and make judgments about what are the good reasons, or the right answers' (Thayer-Bacon 2000, pp. 127–128).[8] The second problem, raised by Paul (1981), is that an over-emphasis on argument evaluation 'turn[s] students into more able sophists, adept at finding fault with positions and arguments with which they disagree but even more entrenched in the egocentric and sociocentric biases with which they began' (quoted in Hitchcock 2018). Third, the usual-suspect syllabus runs roughshod over a very helpful distinction between two types of critical thinking course design that instructors would do well to be aware of: 'One model is infusion, where the strategies, skills, dispositions and attitudes of a critical thinker are developed in the context of subject-matter instruction… The other pure model is stand-alone instruction, in the form of a separate course in critical thinking, using everyday examples that do not require advanced subject-matter knowledge' (Hitchcock 2011, section 3.2).

If I am right to think that the notion of critical thinking is a cluster concept, then the 'infusion' model of course design is the better of the two models for the following reasons.[9] First, students appreciate that what they learn in a critical thinking course is *but one* set of critical thinking qualities that are peculiar to the discipline or domain of inquiry in question. This is, however, *not* to say that the critical thinking qualities that they learn in that course is not 'transferable' (cf. McPeck 1981).[10] For, it was also a part of my first thesis that the closer any two disciplines or domains of inquiry are with

[7] The 2011 paper by Hitchcock, who has written extensively on critical thinking, is also a good resource for module design.
[8] What of, as Thayer-Bacon argues, the role of imagination, intuition or the emotions in the process of critical thinking?
[9] A parallel recommendation concerning the teaching of academic writing skills—via the infusion model—has been made most notably by Wingate who, in numerous publications, argued that a 'curriculum-integrated' or 'discipline-specific' model allows universities to increase the effectiveness of academic literacy instruction and to broaden the reach of such instruction to a larger community of students (see Wingate, Andon and Cogo 2011; Wingate 2015, ch. 4; Wingate 2018).
[10] McPeck (1981) once claimed that critical thinking 'cannot be taught'; if what he means is that the critical thinking qualities of one discipline is *not transferable* to another, this may be an exaggeration. His thesis more plausibly applies to disciplines or domains that do not share a significant overlap of critical thinking qualities (i.e. not within the same critical thinking *loci*).

respect to their content, methodology and research goals, the more likely it is that their critical thinking qualities will overlap. Instructors can, as a result, communicate explicitly to their students what the *loci* of disciplines or domains of inquiry are with respect to which their learning will apply. An upshot of this is that students are less likely to think that the critical thinking qualities of one field can be unproblematically applied to another far-off one. A second benefit of the infusion model is that instructors designing a critical thinking course have at their disposal a rich source of subject or discipline-specific knowledge, readings, questions and debates that can be used to set the stage for the development of their course material. And, this also happens to be consistent with research that shows that critical thinking requires students to be familiar with knowledge or content from a chosen discipline or domain of inquiry (Bailin et al. 1999; Lloyd and Bahr 2010; Piergiovanni 2014).

I wish raise a caveat at this point. It may very well be that no critical thinking course is *either* purely of the infusion model *or* of the stand-alone one; to think otherwise may be to cleave to a false dichotomy. Instead, a course in critical thinking may adopt *more or less* of one or the other type of module design. I should, therefore, qualify my present recommendation by claiming that a critical thinking module that *tunes up* the infusion model over the stand-alone one may be the better pedagogical practice. But, to claim, as I did, that the infusion model of teaching critical thinking is superior to the stand-alone model is not to claim that there is no educational value in the latter model. For, insofar as the stand-alone model is not laden with the baggage of extant knowledge, debates and terminology associated with a particular discipline or domain of inquiry, the stand-alone model may have greater leg-room to promote *understanding* amongst students. While the usual-suspect critical thinking syllabus places a premium on argument structure, and formal and informal fallacies, understanding, by contrast, gives pride of place to the interconnectedness and complexity of extant knowledge, a discussion of which I will now turn to.

2) *Promote 'understanding'*. According to Kvanvig (2003), the notion of 'understanding' can be defined as follows:

> [A]n internal grasping or appreciation of how the various elements in a body of information are related to each other in terms of explanatory, logical, probabilistic, and other kinds of relations that [epistemic] coherentists have thought constitutive of justification (192–193).

As I understand Kvanvig, to understand something is to come to appreciate an intellectually significant or interesting *coherence* in an otherwise disparate and large body of facts or narratives, where this perception of coherence may be what animates the use of epistemic metaphors such as 'lucidity', 'clarity', 'depth', and so forth. If this conception of what it is to understand is on the right track, then one way to promote understanding is for instructors to draw from a range of examples from various disciplines and methods of inquiry as is tolerated by their *shared* critical thinking qualities.[11]

Consider, for instance, a module that has, amongst its primary objectives, that a student be able to think critically about the history of Western representational art. Historical surveys are necessarily descriptive in some sense where the instructor chooses a beginning of some canonised period, and work her way through that period chronologically (e.g. such a module might begin with the Medieval period and subsequently work its way through the high Renaissance and the Baroque epochs). So how then are the skills of critical inquiry be injected into such historical surveys? The three following ways can be proposed: first, to have students understand how the artistic style of one epoch answers or

[11] Perhaps the very notion of a 'general education' module is one that piggy-backs on the good of understanding as it is defined here.

responds to a preceding one; second, to have students see how the main elements of one epoch answer pressing socio-political concerns of the age to which it belongs; third, and finally, to have students identify common elements across all epochs surveyed (e.g. the place of religious worship in art). This not only promotes critical thinking in students it also develops in them an *understanding* of an otherwise large collection of facts or narratives.[12] In addition, instructors may also wish to offer analogous surveys of disciplines in the vicinity of Western representational art, i.e. those of photography and film. By showing, for instance, how the findings from one discipline or domain have analogues in another, the understanding of students of the initial topic at hand (i.e. Western representational art) is deepened.[13]

3i) *Educating for intellectual humility (i): The role of vices.* The virtues in general and the intellectual virtues in particular are 'consistent' and 'stable' traits of character. According to Doris (2002), a trait of character that is consistent is one that is manifested across a *diversity* of trait-eliciting conditions (e.g. a student who displays intellectual humility towards her instructor is also one who displays intellectual humility towards her classmates). Further, a trait of character that is stable is one that is manifested over *iterations* of the same trait-eliciting condition (e.g. a student who displays intellectual humility towards her classmates on Monday is also one who does so on Tuesday). And just as there are vices (e.g. cowardice) to virtues of character (e.g. courage), there are intellectual vices (e.g. arrogance) to intellectual virtues (e.g. humility). One way of educating for intellectual humility is to help students to become *aware* of the trait-eliciting conditions for the vice of intellectual arrogance (or 'close-mindedness'). In my own practice, I found it useful to discuss with my students the psychological attractions of conspiracy theories (e.g. those that trade on 'easy' all-encompassing explanations) of which there is much literature on. Not only were my students engaged by the material they also learned, more importantly, of how thinking can be easily derailed by intellectual vices and this, in turn, generates an *awareness* of how their own thinking are likewise prone to defects (see also Cassam 2016).

Another trait-eliciting condition that is a septic tank for intellectual arrogance is when students discuss topics that are integral to their sense of identity (e.g. race and class) or topics that divide social or political opinions (e.g. tax and immigration). As June Tangney writes, '[p]eople who were successfully primed to experience humility… were slower to retaliate in response to provocation on a laboratory task. In contrast, individuals primed to feel morally superior judged another person's transgression more harshly and as less forgivable' (2002, p. 416). Lest the vice of intellectual arrogance sets in, instructors need to avoid excessively confrontational class activities (e.g. *heated* time-sensitive debates) and to frequently remind students that it is natural to feel a sense of transgression when students come to hear of views anathema to theirs; *but*, what this sense of transgression indicates is how important the topic at hand is, and that it should always be responded to by what Roberts and West (2015) term 'self-vigilance', which is a meta-cognitive state of being acutely aware of one's dispositions toward certain vices or, in this case, that of intellectual arrogance. And, as Whitcomb et. al. (2015) argue, such an awareness of one's dispositions towards intellectual vices enables a student to recognise her cognitive and behavioural dispositions, which in turn allows her to cultivate greater control over these when future trait-eliciting conditions arise.

3ii) *Educating for intellectual humility (ii)*: *The role of 'epistemic defeaters'.* A learning culture or 'ecology' in which students are intellectually humble—i.e. are open to self-correction and receptive of the opinions

[12] Given these three recommendations, the module designer may wish to select a definition of critical thinking that emphasises the knowledge, skills and dispositions related to the successful identification of conceptual, causal or even analogical relations between what is perceived to be disparate ideas, topics or methods of inquiry.

[13] Some might worry that this substitutes 'depth' with 'breadth', which undermines critical thinking. My response is that we only get 'breadth' (in the negative sense) when instructors *fail* to draw the coherence or connections between the plethora of facts or narratives.

of others—need not be one where no intellectual questioning occurs. Intellectual questioning (or the raising of 'critical questions') can be engaged in, indeed robustly engaged in, when instructors explain the *reason* for (e.g. fostering a 'community of inquirers') and *manner* in which such questioning can occur. I limit my discussion to the latter aspect (concerning the manner of questioning). The manner in which intellectual questioning can occur may take the form of what Peels and Pritchard (2020) call 'epistemic defeaters'. Epistemic defeaters come in two shapes. The first type targets the *truth* of what one believes in, while the second type targets the *grounds* upon which one believes something to be true. Here are two examples of the first type of defeater that targets the truth of what is believed in: a student who (falsely) believes that Singapore is located in China may be told (i) by an *authority* on East Asian geography that that student's belief is mistaken or (ii) that Singapore is located in Southeast Asia while none of China is located in Southeast Asia. Here's an example of the second type of defeater that targets the grounds upon which one believes something to be true: a student who believes that Singapore is located in China, when asked why she believes what she does, may respond by saying that she heard her friend saying so—in which case the defeater will take the form of the rejoinder, 'Are you *sure* that your friend knows her geography?'. Epistemic defeaters are not offered simply with the end of provoking doubt in students; rather, they are employed by instructors and students alike to encourage one to be less anxious about states of ignorance or belief suspension. As Peels and Pritchard write, 'The educator would thus be making an epistemic point about the importance of getting an especially secure epistemic basis for one's beliefs when the circumstances demand it'. And, more importantly, when students are *aware* of the reason for and manner in which intellectual questioning can occur in the classroom, the trait-eliciting conditions for the triggering of intellectual vices are dampened.

3iii) *Educating for intellectual humility (iii)*: *The role of the tutor*. If the exercising of the intellectual virtues in general and that of humility in particular requires *skilful attention* and *fitting reactions* to one's environment, then there is an aspect of intellectual humility that cannot be taught or transmitted via testimony. Just as a car mechanic needs to *show* her apprentice how to get to the transmission tunnel in order for the latter to *see* or *grasp* how this is done, so too an instructor will need to display intellectual humility in front of her students.[14] And, just as a car mechanic needs to be aware of what her apprentice knows or does not know about transmission tunnels, so too an instructor needs to be sensitive to the intellectual profiles and limitations of her students. These, I hope, should be fairly self-evident.[15] A cautionary note at this juncture is in order: instructors and their students should be aware that being an intellectually humble person is arguably as demanding as being an ethical person. For, just as being an 'expert' at morality requires being an expert at a vast range of ways of thinking and acting, so too being an intellectually humble person requires, for consistency of character (see above), an awareness of the vast range of conditions that call for the exercise of such a virtue. And, just as it is not completely clear what 'practicing' to be an ethical person involves, so too with respect to the intellectually humble person. But, we can hazard a guess.

Instructors and their students alike can learn, with the aid of concrete examples, of the numerous types of conditions that call for the exercise of intellectual humility and, of the numerous types of conditions that trigger the occurrence of those emotions or vices that are corrosive of intellectual humility, e.g. of arrogance, vanity, anxiety, shame and guilt. To that end, *literary* sources—such as those

[14] The same can be said of a good number of critical thinking skills: reasoning, interpreting, analysing, reflecting, questioning, and so on—all of which require a showing as opposed to a telling.

[15] Indeed, a similar claim has been made with respect to critical thinking. For instance, Thonney and Montgomery (2019) see the critical thinker as one who thinks as 'experts in a discipline' do, and Piergiovanni (2014) recommends that instructors model what critical thinking actually looks like.

of fiction, film and theatre—are effective means of moral or, as our present case might be, critical thinking education. This is because literary sources contain highly detailed or contextualised scenarios where characters deliberate about, for instance, what to do when faced with vexing moral dilemmas (Nussbaum 1990). Students encountering such works are invited to identify with or situate themselves in the psyches of fictional characters, and to see how it is that one *ought* to think or feel should one be caught in a similar situation. The task, then, for the designer of a critical thinking module is to identify those literary sources whose themes are about the skills, abilities or character dispositions associated with *critical thinking*. For instance, the classic jury film *12 Angry Men* can be used to promote reflection on one's biases when reasoning about the truth. More generally, any literary work that showcases characters persevering despite holding on to unpopular but nonetheless worthy beliefs or convictions can be used to exemplify the virtue of intellectual courage. Just as we know that a car mechanic is an expert at what she does when she is able to repair a car model that she has never encountered before, so too we know that an intellectually humble person is successful at what she does when she displays her intellectual virtue at a novel situation.[16]

4) *Student motivation, tutor feedback and assessment design*. Instructors need, first and foremost, to impress upon their students that the qualities associated with critical thinking are essential to their future careers as well as their creative, moral or intellectual pursuits; critical thinking is, in other words, a pre-condition for a fulfilling life.

There is consensus amongst researchers that critical thinking is associated with the ability to *solve problems* (King, Wood and Mines 1990; Nardone and Lee 2010). It is, however, important to stress that the notion of a 'problem' is as multifarious as there are disciplines and research topics; and there are problems that can be solved (e.g. a simple problem in mathematics) and still others where no easy solution is at hand (e.g. global warming, third-world poverty). It has been thought that the latter kind of problems or what scholars have called 'ill-structured problems'[17] are more suited for the cultivation of critical thinking in students. Broadbear, for instance, advertises the virtues of such ill-structured problems as follows:

> Students may be uncomfortable with these types of problems and struggle mightily at solving them, but the process of persevering until reasonable conclusions are reached is essential to critical thinking–the same process they'll experience throughout their life. So, within each lesson designed to promote critical thinking, teachers need to be sure students are considering ill-structured problems. (2003, p. 4)

Although I am sympathetic to this recommendation by Broadbear, there remains a worry that such 'ill-structured problems' may over-represent research questions from the humanities or social sciences at the expense of, say, the physical sciences. In addition, as I argued in an earlier section of this paper, what definition of critical thinking to adopt in the designing of a course should not be decided without having first to consider what the best critical thinking qualities are for epistemic and practical success in a given discipline or domain of inquiry: some disciplines or domains of inquiry are better served by the use of 'structured problems', while others less so. And this is in keeping with my first thesis that critical thinking is a cluster concept.

[16] I suspect that writings on the cultivation of virtues in public socio-political life (e.g. Snow 2010, 2015) offer educators of critical thinking a rich resource to draw from.

[17] Or problems that 'cannot be described with a high degree of completeness; cannot be solved with a high degree of certainty; experts often disagree about the best solution, even when the problem can be considered solved' (King and Kitchener 1994).

In respect of assessment design, instructors may wish to 'reward' students not with conventional marks or grades but with a *further task* where the abilities of students are differentiated by the *difficulty* of that further task assigned by the tutor—e.g. students who do well in an assignment are 'rewarded' not with a mark or grade but with a more difficult version of that assignment, while students who do not fare as well are tasked to work on a less difficult version of it. This method of assessment might lessen the very possible effects of demoralisation faced by lower achieving students in the hopes of motivating them to persevere to the end of the module. It also pushes the limits of high-achieving students.

Further, also with regards to assessment design, instructors may wish to dilute the fashionable gloss seen in many definitions of critical thinking—namely, that the value of critical thinking lies wholly in its instrumentalist nature of being a means of *solving practical problems*.[18] This is because it is not implausible to think that the exercise of intellectual humility (or more generally that of critical thinking) is valuable *in and of itself*: it primes the mind for intellectual surprises, increases the pleasure of inquiry, motivates self-reflection—such an intellectual virtue, therefore, makes bearable moments of intellectual exhaustion and may even set in place a life-long search for intellectual wonder. An over-emphasis, therefore, on hard-fisted instrumentalist conceptions of critical thinking may result in an undesirable tension with the intellectual virtues that are integral to critical thinking.

Finally, with regards to the use of tutor feedback. It a platitude that the comments offered by the instructor constitute an invaluable means to advance the learning of students.[19] But there is a trend amongst educators that recommends the use also of 'peer feedback', which is thought to promote self-reliance and self-correction (Broadbear, 2003). According to Lorencová et. al. (2019), such exercises in offering feedback amongst peers make students aware of the possibly differing perspectives of their peers, which increases their own self-awareness. Some writers, endorsing an idea from Shulman (1999),[20] go a step further to claim that student feedback and their responses to such feedback ought to be made 'public' or circulated freely amongst students sharing a class or enrolled in the same module. But, a word of caution is in order. It is important to keep in mind that just as there are emotions and virtues that promote critical thinking, there are ones that undermine it. The renowned psychologist Carol Dweck (see e.g. Dweck and Sorich 1999) has argued convincingly that shame and humiliation are highly detrimental to learning. This finding becomes all the more pressing in the context of university education where students learn in groups and active student participation is celebrated. Instructors, therefore, need to learn how to offer critical feedback in a way that focuses on the *task* and not on the *student*. Relatedly, one can agree that instructors ought to promote 'active questioning' in class (Lorencová et. al. 2019), and to do so with 'thought-encouraging questions' (Golding 2011), but if what I have suggested thus far is any plausible, such means of student engagement ought to be handled with care. The study of the complex psychological relations between the emotions and the process of student-learning has generated much data that are highly relevant for educators (see Pekrun et. al. 2002, 2010); the final plea here, then, is to extend such research into discussions concerning the topic of critical thinking.

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[18] Halpern writes, 'Critical thinking is the use of those cognitive skills or strategies that *increase the probability of a positive outcome*. It is used to describe thinking that is purposeful, reasoned, ands goal directed—the kind of thinking involved in *problem solving* (2003, p. 6, my emphasis). And, so do Hammer and Green, 'From a cognitive psychological perspective critical thinking can also be seen as a human activity that is focused on *achieving specific goals* such as *anticipating real-world problems*' (2011, p. 304, my emphasis). But not everyone is, say, an engineer or a politician.

[19] For instance, according to Heft and Scharff, 'an aligned course utilizing active learning and multiple opportunities for practice and feedback is an effective means of developing students' targeted critical thinking skills as well as their habit of critical investigation'.

[20] Shulman writes, 'Learning flourishes when we take what we think we know and offer it as community property among fellow learners so that it can be tested, examined, challenged, and improved before we internalize it' (1999).

4. Conclusion

The role of the university is to promote the development of knowledge and, some might say, to serve the economic needs of a society. This goal (and, indeed the economic one) requires that students have the conceptual wherewithal to draw from an extant body of knowledge and to analyse this with the aim of approximating closer to the truth. Universities, in other words, have to foster critical thinking. In this paper I argued for two theses: first, that the notion of critical thinking is what I call a cluster concept; second, that the role of the intellectual virtues in general or that of humility in particular is integral to the critical thinker. The role that a definition of critical thinking plays is a heuristic one—the 'right' definition of critical thinking for the purpose of module design is one that best serves the purpose of achieving epistemic or practical excellence in a given discipline or domain of inquiry given its own particular set of content, methodology and research.

I end this paper with some speculative remarks about the intellectual virtues, which is a topic related to the second thesis forwarded here. The intellectual virtues are about non-trivial and significant aspects of human lives for which these virtues offer the basis of excellence. The intellectual virtues are various in kind (e.g. intellectual inquisitiveness, firmness, rigour); but, although the virtue I chose to discuss in this paper is that of intellectual humility, I am wont to think that the intellectual virtues, more specifically those of inquisitiveness, humility and courage are best *acquired in tandem* with each other. These virtues, in other words, come as a package deal: for, one cannot genuinely be said to love knowledge[21] or be intellectually inquisitive if one is woefully indifferent to what the possible objections to one's favoured positions are. Thus, in educating for intellectual inquisitiveness, there is a need for educators to address this indifference—an apathy that may result from a fear of knowing and an over-confidence of the veracity of one's beliefs. The overcoming of this apathy or fear, therefore, requires the exercise intellectual courage. But, the exercise of intellectual courage, which is a disposition to understand difficult material or that which engenders self-doubt, is often best done by being receptive of the opinions of others, which is the other-regarding virtue discussed in this paper, namely humility. As a boat moves most quickly when all of its oars are in action, so a person is intellectually virtuous when all of her virtues are informing her thoughts and action. But, how this is to be managed in practice is, surely, the subject for a different paper.

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[21] A more thorough discussion of the intellectual virtue of a 'love of knowledge' is offered by Robert and Woods (2007: chapter 6). For a discussion of the virtue of 'curiosity' see Kvanvig (2003; 2012). Finally, for a more general discussion of the intellectual virtues see Baehr (2011) and Zagzebski (1996).

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