

Université de Montréal

**What is reflection?
A conceptual analysis of major definitions
and a proposal of a five-component definition and model**

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Résumé

La réflexion est considérée comme un élément significatif de la pédagogie et de la pratique médicales sans qu'il n'existe de consensus sur sa définition ou sur sa modélisation. Comme la réflexion prend concurremment plusieurs sens, elle est difficile à opérationnaliser. Une définition et un modèle standard sont requis afin d'améliorer le développement d'applications pratiques de la réflexion. Dans ce mémoire, nous identifions, explorons et analysons thématiquement les conceptualisations les plus influentes de la réflexion, et développons de nouveaux modèle et définition. La réflexion est définie comme le processus de s'engager (le « soi » (S)) dans des interactions attentives, critiques, exploratoires et itératives (ACEI) avec ses pensées et ses actions (PA), leurs cadres conceptuels sous-jacents (CC), en visant à les changer et en examinant le changement lui-même (VC). Notre modèle conceptuel comprend les cinq composantes internes de la réflexion et les éléments extrinsèques qui l'influencent.

Mots-clés : réflexion, pratique réflexive, Dewey, Schön, pratique professionnelle, revue systématique, pédagogie médicale, pédagogie des sciences de la santé

Summary

Although reflection is considered a significant component of medical education and practice, the literature does not provide a consensual definition or model for it. Because reflection has taken on multiple meanings, it remains difficult to operationalize. A standard definition and model are needed to improve the development of practical applications of reflection. In this master's thesis, we identify, explore and thematically analyze the most influential conceptualizations of reflection, and develop a new theory-informed and unified definition and model of reflection. Reflection is defined as the process of engaging the self (S) in attentive, critical, exploratory and iterative (ACEI) interactions with one's thoughts and actions (TA), and their underlying conceptual frame (CF), with a view to changing them and a view on the change itself (VC). Our conceptual model consists of the five defining core components, supplemented with the extrinsic elements that influence reflection.

Keywords: reflection, reflective practice, Dewey, Schön, professional practice, systematic review, medical education, health professional education

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List of acronyms and abbreviations

ACEI: attentive, critical, exploratory, and iterative

CF: underlying conceptual frame

CT: critical thinking

PBL: problem-based learning

S: self

SCA: script concordance approach

TA: thoughts and actions

TAs: TA_{starting/substrate}

TAp: TA_{processed}

VC: view on change

Introduction

The dawn of reflection

The preponderance of reflection and developed thinking is not a recent happening. The virtues of reflection were already noted by the Greek philosophers. In the fourth century BC, Socrates remarked that “to let no day pass without [...] examining both myself and others is really the very best thing that a man can do, and that a life without this sort of examination is not worth living.”¹ In his footsteps, the Stoics considered that the universe was fundamentally rational and that it could be wholly apprehended through the usage of reason. As Stoicism later flourished, one of its most famous disciples, Marcus Aurelius, noted in his *Meditations* that although “the universe is change, our life is what our thoughts make of it.”² Salience of the rational mind over the sentient being is one of the most significant legacy of Greco-Roman antiquity.

It was more than a millenary later, in 1637, that René Descartes beautifully translated the ascendancy and elemental nature of thoughts with his *Discours de la méthode*'s famous “Cogito ergo sum.”³ Henceforth, not only was thinking essential to a worthy existence, thinking was deemed the proof of existence itself. Only a few decades later, reason and the triumph of reason would define the 18th century as the Age of Enlightenment. Carried by the works of Montesquieu, Voltaire, and other great philosophers of the time, rational thought would move from proving the existence of man to stewarding the conduct of society. Questioning the older tenets of authority, the new enlightened worldview gave both man and reason a more central place in all human endeavors.

Whereas the origins of the process of reflection can be traced back at least to the Greek philosophers, the word *reflection* only came into usage in the 14th century. Reflection, as a word, saw a major increase in usage during the 18th century,⁴ probably fuelled more by the study of light than the study of thought. But it is no coincidence that the century that witnessed the rise of reason—and reflection—was to be called the Age of Enlightenment, and its thinkers the *Lumières*. Whereas the object of reflection in the study of optics is *light*, the lasting contribution of reflection in the study of thought has been *enlightenment*. Stemming from the Latin roots *re-* and *-flectĕre*, reflection compounds the ideas of *re-*, back and again, and *-flectĕre*, to bend.⁵ Analogous to mirrors bending light back and again to increase the brightness of space, reflections within the mind bend thoughts back and again to allow their greater illumination and closer scrutiny.

Throughout time, reflection and deep thinking has undeniably increased in importance and in relevance. From the individual ponderings of philosophers, it has spread to all areas of human study and activity. That the world of today has been deeply influenced by the forces of rationality and reflection is hardly disputable.

The bittersweet (at)traction of reflection in education

As education is always tributary to the wider societal context that it inhabits, it comes to no surprise that the beacon of developed thinking shines brightly on it; the great influence of rationality in philosophy has trickled down to pedagogy. To educators, finding the answer to questions of how to think, and more importantly, of how to *teach* how to think is of prime interest.

In the recent decades, the teaching of reflection has emerged as one of the promising candidates. In multiple disciplines and professional fields,⁶⁻⁹ particularly in teachers' education and the health science professions, reflection has gained a tremendous foothold. In medicine¹⁰⁻¹² and in nursing¹³⁻¹⁵ for example, reflection is viewed as a crucial component of curriculum and practice.¹⁶⁻¹⁸ For many, it is held to be a requirement for life-long personal and professional learning.¹⁹ It has been widely adopted by practitioners as evidenced by the myriad applications that have been developed based on it, such as learning journals,²⁰ portfolios,^{21, 22} supervision,²³ or even curricula.^{24, 25} In current areas of research, assessment, and teaching in education, reflection is omnipresent.

But to stress the importance of a construct informs us very little about the construct itself. While the literature on reflection is predominantly concerned with underlining the *importance* and applications of reflection, knowing that reflection is a significant element of pedagogy does not contribute knowledge on what reflection *is*. Yet, understanding how—or if—the construct of reflection differs from that of thinking in general is needed for reflection to provide its purported benefits in practice. Because how to reflect cannot be taught if the process of reflection is ambiguous, to understand what reflection truly entails is a key prerequisite before teaching it. For the construct of reflection to be useful, its constitutive elements, the ways it operates, and the ways by which it generates its effects must be clearly delineated.

Before and concurrently to its uptake by practitioners, reflection has attracted the attention of theorists. As evidence of its popularity to scholars, it has been the subject of inquiry, development, and interpretation by many influential authors.²⁶⁻²⁸ A considerable number of definitions and

models of reflection have been established and have attempted to clarify it.^{10, 11, 29, 30} Perhaps a fallout of its popularity and development in many different fields, contexts, and with different goals, reflection has come to take many forms creating an imprecise meaning.³¹⁻³³ Reflection has become an arcane construct for which there is no widely accepted definition or conceptualization, which has notably impaired its operationalization.³⁴⁻³⁶

Although the myriad models of reflection in use contributes to a divergent understanding of reflection, the major paths of divergence can be traced back to a few influential authors. By retracing our steps backwards to the origins of reflection in education, it will be perhaps possible to untangle the current confusion. Any reflection on reflection will be more intelligible following a broad overview of major theorists. Starting with the great John Dewey, we will move forward in time and ideas to examine other leading authors and their contributions to our current view of reflection.

Major authors and contributions to reflection

Dewey and the birth of reflection in education

If the dawn of reflection in philosophy occurred in Greece, it was in America that reflection emerged as a construct in education. The roots of contemporary reflection hail from John Dewey, considered by many to be the father of reflection. As both a philosopher and an educator, Dewey was interested in the questions of how to conduct our thoughts and how to educate young minds to conduct theirs. At the crossroads of philosophy and education, he was well positioned to coin the first definition of reflection. In his seminal book *How we think*, published in 1910, Dewey defines reflective thought as:

“Active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends.”³⁷

For Dewey, reflection is a specific mode of thought, to be distinguished from others such as belief, invention, and stream of consciousness.³⁸ Every reflective operation involves two subprocesses that Dewey reports as a “state of perplexity, hesitation, doubt” and an “investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested

belief.”³⁷ The process of reflection originates with uncertainty and develops with the search of a resolution to this uncertainty by contemplation of the underlying factors contributing to it. It is this “[d]emand for the solution of a perplexity [that] is the steadying and guiding factor in the entire process of reflection.”

To Dewey, reflection is at its essence a thought process—a cognitive process. But he was also well aware of affective repercussions in learning and in reflection. In his analysis of Dewey’s work, Rodgers identifies four attitudes conducive to reflective thought: whole-heartedness, responsibility, directness, and open-mindedness.³⁸ As described by Dewey, reflection is a specific thought process influenced by the wider context of affective dimensions, attitudes, and environment.

Dewey being one of the founders of the school of Pragmatism, the meaning of his work can best be understood in the broader context of education, democracy, and society. Democracy was of the utmost importance to Dewey, and to him, education was the indispensable instrument to its development and continuation. In *The School and Society*, Dewey remarked that “[d]emocracy has to be born anew every generation and education is its midwife.”³⁹ Society is dependent on democracy, democracy on education, education on learning, and learning on reflection.

Reflection starts at the smaller individual scale, where its end is to inform learning and education. In *Education and Experience*,⁴⁰ Dewey positions reflection as the key element of his new proposed epistemology of learning. Instead of relying on traditional views of education, he devises a theory of experience that could be the basis of progressive education. In it, the learner’s experiences are the elemental building blocks of learning. Through reflection the experiences are apprehended and reflected upon to create meaning. By having trained one’s thought to “think *well*”, that is with curiosity, suggestion (to Dewey a combination of ease, extent, and depth), and with orderliness,³⁷ reflection procures the learner with continued growth.

Extended to the societal scale, the construct of reflection is envisioned by Dewey with greater purpose than the sole development of thinking. To Dewey, reflection is the key means to the greater end of perpetuation of democracy in society.⁴¹ In *My Pedagogical Creed*, Dewey professed that “[t]hrough education society can formulate its own purposes, can organize its own means and resources, and thus shape itself with definiteness and economy in the direction in

which it wishes to move.”⁴² Because one of the foundations of his view of education is reflection, clearly Dewey had great societal motives for it.

Dewey was the first contemporary author to conceptualize reflection. He defined reflection by what it is, i.e., a distinct form of thinking requiring precise characteristics. As a pragmatist, he also described reflection by its purpose and in its wider context, i.e., an indispensable means for learning, for education, and ultimately for democracy. In his work on reflection, Dewey has been uniquely encompassing by characterizing it in such a threefold manner: by definition, purpose, and context. As such, it is unsurprising that major features of his conceptualization of reflection still hold more than 100 years after their inception.

Habermas’ emancipatory reflection

Among the founding figures of reflection, Habermas is arguably the one with the less concern for the inner structure and precise definition of reflection. A philosopher of the Frankfurt school, Habermas was rather interested in the role of reflection within critical theory. Critical theory views the primary goal of philosophy as the assessment and overcoming of oppressive social structures, “to liberate human beings from the circumstances that enslave them.”⁴³ Whereas Dewey was concerned both with individual and societal consequences of reflection at the level of the learners, Habermas’ interest in reflection laid almost solely within its function at the level of society. To Habermas, reflection has a sociological function well before an educational one.

In *Knowledge and Human Interests*,⁴⁴ published in 1971, Habermas reacts to what he viewed as a sweeping current of “elimination of epistemology in favor of unchained universal ‘scientific knowledge’.” He objects to the omnipresence of positivism and the regression of the prevailing level of reflection as a result. To Habermas, knowledge can never be dissociated from the human interests that it originates from. This is referred to by Habermas as “knowledge-constitutive interests.” Thus, because knowledge—even scientific—emanates from particular interests, scientific methods cannot occult the need for epistemology and a justification for the foundation of that knowledge. Albeit without providing a clear image of what it entails, Habermas describes self-reflection as a means to render conscious the link between knowledge and its related human interests. By making conscious the underlying linkage of knowledge and interests and by negating the objectivism that falsely conceals the connection between them, self-reflection becomes a tool to develop new and less-constrained knowledge.

Habermas identifies three domains of knowledge where self-reflection can unfold.^{44,45} The first is the *technical* area, involving empirical-analytic methods; this domain is exemplified by the natural sciences that seek to control and manipulate the environment (e.g., physics, geology). The second area is the *practical* area, involving historical-hermeneutic methods; this domain is exemplified by social and cultural sciences that seek to clarify communication and subjective but mutual understanding (e.g., history, theology). The third is the *emancipatory and liberation* area, involving self-knowledge and the treatment of normative problems of the human condition and context, as exemplified by the critical social sciences.^{46,47} It is within the last domain that full self-reflection occurs and where “knowledge for the sake of knowledge attains congruence with the interest in autonomy and responsibility.”⁴⁴ To Habermas, self-reflection in full power will lead towards justice, equality, and freedom.

Although Habermas’ works is at times “convoluted” and “not easily accessible to educators,”⁴⁷ his influence on the understanding of reflection is still manifest today. One lasting contribution is that reflection ultimately has a purpose of emancipation. Another is his typology of the three domains where reflection can occur (technical, practical and emancipatory), and how they differ among themselves. Most importantly perhaps, he gave rise to the acceptance that reflection—not only empiricism or positivism—could be a valid method of knowledge generation. By observing that some disciplines developed “out of the professionalized realms of action that require practical wisdom”⁴⁴ and where empirical-analytic methods are insufficient, Habermas heralded Schön and his coining of reflective practice.

Schön’s reflective practice

By coining the concept of “reflective practice,” Schön massively stimulated the interest in and uptake of reflection. This holds particularly true in the areas of professional practice, where Schön is by far the most cited author.⁴⁸

It is interesting to note that the most popular author on reflection was more influenced by the father of reflection than what is commonly reported: Schön’s Ph.D. thesis was about Dewey’s theory of inquiry.⁴⁹ This can come as a surprise because the works of Dewey and Schön are often pitted at polar opposites, the former presenting a rationalist-technicist model and the latter an experiential-intuitive model.⁵⁰ The detachment came about because of their conflicting views on the scientific method; whereas Dewey’s reflection is rooted in it, Schön’s reflection aims to transform it.

A need for a new epistemology of professional practice

In *The Reflective Practitioner: How Professionals Think in Action*,²⁶ published in 1983, Schön alludes to a “[c]risis of confidence in professional knowledge.” To Schön, this crisis developed out of the inadequacy of the then dominant model of professional knowledge: technical rationality. Originating from an “increasingly powerful scientific world-view,” technical rationality is the “positivist epistemology of practice.” To Schön, technical rationality served as the inadequate justification for applying “the achievements of science and technology to the well-being of mankind.” First gaining prominence in disciplines such as medicine and engineering, it spread to social sciences in fields such as education, social work, or planning. According to Schön, technical rationality can be well adapted to disciplines where thinking can be separated from doing, and where means can be differentiated from ends, such as medicine or engineering. But it inevitably reaches its limits in fields such as education or social work, where theory and action are fused, and when what matters more is action rather than thoughts. Schön later submits that professional practice in medicine and engineering are more akin to education and social work than is commonly accepted. Indeed, to Schön, all professional practice entails a certain degree of fusion between theory and action, between means and ends. In all practice, the process of problem setting (determining the ends) is as important as the process of problem solving (determining means). And because technical rationality is only concerned with problem solving, it can only partially explain professional knowledge. The “[c]omplexity, uncertainty, instability, uniqueness and value-conflict” of practice “do not fit the model of technical rationality.” Professional practice was in need of a new foundation for its knowledge, of a new epistemology.

By examining real-life practice in five professions, Schön contributed one such epistemology of professional practice: *reflection-in-action*. Far from the rigors of technical rationality, Schön postulated that the expertise of professionals arose from “professional artistry” which derives from *knowing-in-action* and develops through reflection-in-action. In the aforementioned book and the subsequent *Educating the Reflective Practitioner*,⁴⁹ he investigates and describes how reflection-in-action works and how to educate professionals to become reflective practitioner.

Knowing-in-action and reflection-in-action

Unfortunately, often writing with metaphors and examples,⁵¹ Schön does not provide an explicit model or formal definition of reflection or reflection-in-action.³⁵ He did however expose the unfolding “‘moments’ in a process of reflection-in-action” and, quite importantly, its relation with

knowing-in-action.⁴⁹ Indeed, reflection-in-action can only be understood in relation to knowing-in-action, which Schön relates to “the sorts of know-how we reveal in our intelligent action,” where “the knowing is *in* the action.” Knowing-in-action is a knowledge that “we are characteristically unable to make [...] verbally explicit.” Expanding on the concept of *tacit knowledge* from Polanyi’s *The Tacit Dimension*,⁵² Schön posits that this tacit knowing-in-action is the basis for the “competence practitioners sometimes display in unique, uncertain, and conflicted situations of practice.” Even if it cannot always be explicated, it clearly exists, just as an artist’s artistry exists without having to be verbally explicated, or as a skilled physician can sometimes immediately recognize a disease without consciousness of the clues that have triggered the diagnosis.

From this knowing-in-action, Schön reports that there are situations where the habitual actions and routine responses of knowing-in-action “produce a surprise—an unexpected outcome [...] that does not fit the categories of our knowing-in-action.” The usual action has not been met with the usual response. This is where reflection-in-action kicks in.

To Schön, reflection-in-action has a “critical function” of “questioning the assumptional structure of knowing-in-action,” and makes us “think critically about the thinking that got us into this fix or this opportunity.”

For reflection-in-action to attain this critical function, Schön outlines a four-element structure. The first element involves questioning the frame of the current situation to reframe it differently. This means that “we may, in the process, restructure strategies of action, understandings of phenomena, or ways of framing problems.” The second element calls for the use of past experiences of knowing-in-action as a fund of exemplars to be activated and to inform the present (re)framing of the problem at hand. The two first elements assist in developing a new understanding diverging from—but related to—the starting knowing-in-action. The third element revolves around experimentation, what Schön’s call “on-the-spot experiment.” The newly developed viewpoint and frame of understanding leads us to “try out new actions intended to explore the newly observed phenomena, test our tentative understandings of them, or affirm the moves we have invented to change things for the better.” This experimentation-in-action allows for continuous reappraisal of knowing-in-action with reflection-in-action. The fourth element is

the stance of the practitioner towards inquiry. Reflection-in-action asks for the practitioner to be both agent and experient,²⁶ spectator and manipulator of the experimentation; this is quite unlike technical rationality which requires “objectivity, control, and distance.” In actuality, Schön stresses that these elements are rarely as definite as they are made out to be. Because they unravel in action, they can appear to be fused, particularly to observers.

Reflection-in-action and reflection-on-action

In addition to reflection-in-action, Schön described reflection-on-action. Whereas reflection-in-action happens in an “*action-present*—a period of time [...] during which we can still make a difference to the situation at hand,” reflection-on-action happens after the fact. In reflection-in-action, thinking and action are linked; in reflection-on-action, they are separated. In the latter, we try to “discover how our knowing-in-action may have contributed to an unexpected outcome” in tranquility or during a pause from the action, akin to Dewey’s view of reflection as the “attentive, persistent, and careful consideration of any belief.” Hence, one manifest difference between reflection-in and on-action is the context of timing of the reflection; one occurs during the action, and the other following it. It is unclear in Schön’s works if there are further differences, e.g., in the structure of reflection-in-action and of reflection-on-action, or if they are the identical mental activities, differing only in their time context.³³

Schön’s strong imprint on reflection

Notwithstanding imprecisions in Schön’s account of his views on reflection, his imprint on its current understanding is indubitable. Firstly, because Schön was interested in and wrote extensively about professional expertise, he has been instrumental to the uptake of reflection and reflective practice by educators in areas of professional practice. Secondly, he gave credibility to forms of knowledge not produced within the technical rationality epistemology. By providing convincing arguments for reflection-in-action, Schön was able to restore the value of experience over theory in professional practice. Thirdly, although their distinctiveness is unclear, the description of both reflection-in/on-action has given educators a better grasp of the reflection and how it might be structured.

Kolb’s experiential learning

From professional practice back to education; from Schön, we now turn to Kolb and his *Experiential Learning*,²⁷ published in 1984, shortly after the *Reflective Practitioner*. It is surprising to discover how little Kolb writes about reflection in comparison to the tremendous impact he has

had on it. Nowhere in his works does Kolb define reflection or describe its structure, yet he is one of the most cited authors on reflection.⁴⁸ What his works does accomplish is to ground the construct of reflection within his *Experiential Learning process*, the extensively adopted framework that he developed.²⁷ Borrowing Lewin's *Experiential Learning Model* and its cycle of four constitutive poles (concrete experience, reflective observation, abstract conceptualization, and active experimentation),⁵³ Kolb expands it with the works of Piaget and Dewey to build his theory of experiential learning.²⁷ Kolb's resulting unifying model retains the four original poles but does away with the cycle to delineate and detail the direct linkage between experience, reflection, conceptualization and experimentation.

Contrary to Schön who separated theory from experience (technical rationality from professional artistry), Kolb was concerned with providing a solid linkage between these *prima facie* opposed realities. His experiential learning model bridges theory and practice by having reflection play the critical function of intermediary between the three other poles. Starting with concrete experience, reflective observation can lead to conceptualization or active experimentation. Conversely, starting with conceptualization or experimentation, one can use reflection to relate them to past concrete experiences. To Kolb, this transfer—facilitated by reflection—from one pole to another is a key factor in the process creating knowledge, i.e., learning. Reflection is thus conceived first and foremost as a *process*; because it is a process, the nature of reflection is understood by Kolb through its relations to others concepts, and not by what this reflective process is *per se*. Consequently, with the works of Kolb, the construct of reflection did not gain a new definition nor greater intrinsic understanding. But reflection did gain a new position and purpose in providing *learning from experience*.

Boud, Keogh, and Walker's affective activities

Kolb's view of reflection as a process having the key purpose of creating meaning and learning from experience was taken on by Boud, Keogh, and Walker who made it central to their understanding of reflection. In their book *Reflection: Turning Experience into Learning*, published in 1985, Boud et al. define "reflection in the context of learning" as

“a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations.”²⁸

It is unmistakable that to them—as to Kolb—the defining characteristic of reflection first consists of its role as the process that *turns experience into learning*. Unlike Kolb who provided little detail on how reflection operates to turn experience into learning, Boud et al. formulate a model for the reflective process specifying how “behavior, ideas, and feelings” (experiences) are processed by reflection and bring about “new perspectives on experience, change in behavior, readiness for application, and commitment to action” (learning outcomes).

The key components of the reflective processes are organized in three stages. The first is “returning to experience” to “replay the experience” and “stand back from the immediacy of the experience.” This provides the learner with data for subsequent processing by viewing the experience from other perspectives and by becoming aware of new ideas and feelings arising from it. The second stage is “attending to feelings;” in this stage, we utilize positive feelings and removes obstructing feelings “in a way that enables us to regain our flexibility and creativity in responding” to our appraisal of the experience. The third stage is “reevaluating experience” which involves examination of the emerging data from the previous two stages. Boud et al. outline four elements of the process of reevaluation that “can contribute to reflection and enhances its outcomes.” These are *association*, the “relating of new data to that which is already known;” *integration*, the “seeking [of] relationships among the data;” *validation*, the “determin[ation] of authenticity of the ideas and feeling which have resulted;” and *appropriation*, the “making [of] knowledge one’s own.” As learners undergo these three stages and use the four elements of reevaluation of experience, their experience are reflectively processed and lead to new cognitive outcomes, including “a new way of doing something, the clarification of an issue, [...] or the resolution of a problem.” Reflection also leads to outcomes of an affective nature, such as “changes in our emotional state, our attitudes or sets of values.”

By proposing both a definition and model for reflection, Boud et al. have bolstered the understanding of reflection. Among their various contributions, their most remarkable is without doubt their emphasis on the affective dimensions in reflection, which feature prominently in both

their model and definition. With Dewey, Habermas, Schön, the conceptualization of reflection was predominantly removed from emotions, with Kolb partly accounts for it; following Boud et al. the conceptualization of reflection is as affective as it is cognitive.

Moon and the ill-structured nature and material of reflection

Moon's work is the last stop in our broad overview of theorists of reflection. She published *Reflection in Learning & Professional Development* in 1999,³³ with some hindsight with regards to the significance of the contributions of previous theorists. The result is an encompassing study of reflection that is well informed by previous theories and by common-sense views of it, but also by her pragmatic concern to clarify the concept of reflection for educators in everyday practice.

Moon attentively considers the similarities and discrepancies in preceding conceptualizations of reflection before producing her own. One of Moon's key conclusion is that reflection is concerned with "complicated, ill-structured ideas" and situations of uncertainty.³⁰ This echoes Dewey's "perplexity, hesitation, doubt" or Schön's "unexpected outcome [...] that does not fit the categories of our knowing-in-action." Because she is interested by the pedagogical application of reflection, Moon also recognizes that there is "close association with, or involvement in, learning and the representation of learning" and reflection. To Moon, reflection is:

*"a mental process with purpose and/or outcome in which manipulation of meaning is applied to relatively complicated or unstructured ideas in learning or to problems for which there is no obvious solution."*³³

To arrive at this definition, Moon establishes that the multiple views of reflection can be incorporated into an "input-outcome process," where *inputs* are the "what we know" that are processed by reflection to produce *outcomes* representing the "purposes for which we would reflect." To Moon, differences in models of reflection in the literature can be accounted for by their different outcomes and purposes. But considering that neither the outcomes nor the purpose characterize reflection in of themselves, she submits that the core process of reflection is common to all models and that "apparent differences in the literature of reflection relate not to the process itself but to its different applications and framework of guidance that shape these."³³ Reflection is, at its essence, a mental process that manipulates meaning applied to

complex ideas. By answering questions of “what to reflect about,” “how to reflect,” “what to reflect for,” “where is reflection applied,” in attempts to coordinate the models, Moon has provided a framework for analysis of reflection that is perhaps more compelling than the definition she devised using them. These questions foster an understanding of reflection that is multifaceted and more encompassing of the multiple views of it that have been previously developed.

In her extensive inquiry about reflection and learning, Moon answers the questions of “what to reflect for” and “where is reflection applied,” by identifying three roles for reflection in learning: reflection in initial learning, reflection in the process of representation of learning, and reflection in the upgrading of learning. In her *Map of learning and the representation of learning*, she gives reflection critical functions in the “making meaning, working with meaning, and transformative learning,” and in “deep learning.”⁵⁴ Because she explores reflection in the context of learning, Moon also expands our understanding by detailing conditions for fostering reflection (e.g., time and space, facilitators, institutional and emotional environments) and potential outcomes for it (e.g., learning or the production of further material for reflection, action or other representation of learning, building of theory).

Unlike other theorists, Moon’s influence on reflection does not lie in her original contribution to delineating its fundamental features. Rather, as a pragmatic theorist and educator interested in applying reflection in real-life contexts, Moon questioned, refined, and clarified reflection and its operationalization in learning, which has significantly enhanced our comprehension of it.

Research problem and purpose

Our examination of reflection, from John Dewey to Jennifer Moon, provides a better grasp of its conceptualization according to major theorists. A survey of the leading definitions and models of reflection provides an indicative account of what reflection is and how it came about. Had all theorists and educators worked with or expanded the same core model of reflection, a consensual understanding might have emerged. Unfortunately, because this has patently not been the case, there are important incompatibilities in both theoretical underpinnings and practical applications of reflection.³⁴⁻³⁶ To resolve the current complexity and contradictions of reflection, what is needed, in addition to an overview of authors, is a scrutiny of why and where the aforementioned interpretations of reflection clash.

In this section, we identify how discrepancies and uncertainties in ways of characterizing reflection have resulted in a confused application of reflection. Informed by this analysis, we outline the central elements and criteria for our research process that aims to define and model reflection.

The confusion and insufficiencies of common conceptualizations of reflection

Reflection has been of interest to many theorists who have each emphasized different and divergent characteristics of reflection to create their model of reflection. Compared to one another, current models appear individually incomplete yet are impossible to fully harmonize. Case in point, it is impossible to reconcile Boud et al.'s exploration of experience to create meaning with Schön's reflection-in-action involving "thinking on our feet" in an "action-present" as both an "agent and experient" of experimentation. Because of the lack of clarity that has resulted from the host of existing models, additional authors have put forth even more models^{13, 19, 55-57} attempting to mitigate the lack of standardization, but in fact only compounding the problem.

The difficulties in defining reflection are not an exception in the broader context of pedagogical concepts or processes; in education, reflection is only a particular case where matters of definition are unresolved. Other concepts like competence, motivation, or intelligence come to mind. Thus, although what follows is directly related to reflection, the analysis could probably be applied to other pedagogical concepts.

Defining reflection as an exemplar of defining a pedagogical process: *extrinsic* definitions of reflection

We have presented six models of reflection that can be grouped on the basis of how the process of reflection is defined: extrinsically or intrinsically. Kolb's model of reflection is the most extrinsically-defined. As discussed, Kolb characterizes reflection by its relation with—and distinction from—the other elements of his experiential learning model. This can be termed a **context-driven definition** of reflection. Getting a sense of where reflection is situated in the context of a model which encompasses it does help us delineate what reflection *is not*, but less what reflection *is*. Kolb's context-driven definition of reflection structures its surrounding environment but not its inner working and requirements, which can be a cause for confusion in understanding and operationalization.

Another extrinsically characterized description of reflection is Habermas' emancipatory reflection. To Habermas, the most developed form of self-reflection must lead to justice, equality, and freedom. There is little doubt that emancipation might be more easily attained through reflection, but it is another thing altogether to define reflection as such. In doing so, Habermas has coined an **outcome-driven definition** of reflection. Even if a definition driven by outcome is more informative than one driven by solely by context, significant issues remain. First, defining reflection by what it must *ideally* and *eventually* lead to overlooks major differences between the *outcome* of reflection and the *process* of reflection. There is a difference between practicing the violin and virtuously performing a concerto; because a process will perhaps rarely lead to its desired outcome, defining it by its outcome incurs the risk of negating valid and useful processes that can fall short in immediately producing the prescribed outcome. The second major issue, which afflicts both context- and purpose-driven definitions of reflection, is more critical: they reveal very little about how to foster its development. If reflection is this process that helps learners learn, but educators know little about the process *itself*—save for its context or outcome—it become particularly arduous to help learners learn. Extrinsically defined reflection can be helpful in the understanding of reflection, but will always be insufficient *by itself* to direct its application and transfer to learners.

Defining reflection as an exemplar of defining a pedagogical process: *intrinsic* definitions or models of reflection

What follows is that definitions or models of reflection that characterize it by what it is in itself, i.e., intrinsic definitions of reflection, are more useful than extrinsic ones. This holds particularly

true with regards to teaching, which is greatly facilitated when a pedagogical concept characterized *from within*. Dewey's definition of reflection is one example of definition that does not call for an outside reference to context or outcomes. Defining reflection as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends"³⁷ communicates accurately what reflection is *in itself* and thus allows for better grasp of its nature. Although Boud et al.'s definition of reflection ("a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations"²⁸) is chiefly an outcome-driven definition, their model comprises three aforementioned stages that define the inner structure of reflection. By intrinsically characterizing reflection, Boud et al. contribute an example of a **structure-driven model** of reflection, which allows for superior understanding—and, most notably, fostering—of what reflection entails.

In the same vein, some structure-driven models of reflection are also **sequence-driven models**; in addition to characterizing the essential elements of reflection, sequence-driven models order them. Boud et al.'s preceding model of reflection is an example where the key subprocesses of reflection are ordered. Many other proposed models of reflection are organized in such a way.^{13, 58} While adding a sequence to reflection can help to outline and unscramble it, it does so by formalizing an added ordering constraint that might not be mandatory. The previously noted incompatibility between Boud et al.'s view of reflection on experience and Schön's reflection-in-action is largely due to a chronological bounding of reflection in the former.

Threats to application and validity of reflection

Because reflection has been too loosely defined by extrinsic definitions (context-driven or outcome-driven) or too rigidly by sequence-driven models, and has been expanded in diverging directions, in multiple disciplines, there remains a lack of a clear core meaning for it. But in light of the increasing publications on the subject of reflection, this limitation has not prevented eager researchers and educators from developing myriad applications that are purportedly reflective.^{19-23, 55} Unfortunately, the development of applications of reflection using an imprecise conceptualization has arguably magnified the problem of comprehending the theory of reflection even further.

Despite the increasing number of publications, the evidence in support of the use of reflection remains mainly theoretical.¹¹ The dearth of empirical proof of its practical effectiveness is, to the

very least, attributable to the difficulty in reliably operationalizing a construct without a consistent definition (or conversely to define a construct that has been operationalized in differing ways).⁵⁹
⁶⁰ This is expected because as each author has a unique affiliation and following, multiple disparate models and definitions of reflection are currently in usage. These resulting conceptualizations have widened but also diluted the common meaning of reflection, which has at times been equated to simple thinking.^{31, 61} Indeed, there currently does not exist a definition or model of reflection that is both sufficiently complete and discerning of the elements of reflection described by its major theorists. It is not simply when the word reflection is used that reflection occurs, or when an application is said to be reflective that it is.

The lack of consensual definition of reflection has without doubt impeded the development of a corpus of tools to reliably analyze, measure and assess reflection.⁶² In order to legitimately use the construct of reflection in practice, it is crucial to be able to first reliably identify it and distinguish it from other related but different constructs or processes. Only then might the operationalization of reflection provide its alleged benefits and evidence for the usefulness of reflection be empirically verified. Continuing on the path of confusion and uncertainty will only increase threats to the validity of reflection.^{35, 62}

Research question: What is reflection and how to define it?

Sir Francis Bacon observed four hundred years ago that “truth will sooner come out from error than from confusion.”⁶³ For reflection, this is not to say that a unique truth can be identified; rather, it is to say that reducing the haziness and singling out discrepancies between models will help to shine new light and better knowledge on reflection. Previous scholars and researchers have taken heed of the lack of understanding of reflection and have published excellent reviews on the general concept of reflection,^{15, 29} particularly in medical education.^{10, 11} The aim of most was primarily to review the existing literature, without the set purpose of ensuring that all articles referred to reflection as a clearly defined and uniform construct. A few have attempted to specifically clarify the definition of reflection, but without using a formal systematic process having the set aim of providing a *unified* definition.^{7, 38, 64} For both the newcomer and the expert reflection remains a complex construct, difficult to grasp, to vulgarize, and thus to teach.

Reflection is vitally in need of a standard definition and model for reflection. However, any proposal of yet another conceptualization of reflection bears the inherent possibility of further

compounding the complexity of what reflection truly encompasses. To prevent this and build a new definition and model for reflection from the ground up that will achieve widespread acceptance and adoption, five key criteria will direct our research and thematic analysis processes.

1. Structure-driven definition and model

We have already reported on inherent pitfalls in ways of defining pedagogical processes; thus, our first criterion is to coin a conceptualization of reflection that is structure-driven. Even if the context, purpose, and sequence of reflection are potentially meaningful adjuncts to the understanding of reflection, we will attempt to define reflection without these added constraints. Reflection must be defined intrinsically by what it is in itself.

2. Systematic representativeness

All authors have unquestionably been informed by antecedent conceptualizations of reflection before putting forth their own. Resolving effectively the variability and unifying the existing conceptualizations can only be achieved by accounting for all the major theorists that have shaped reflection as it is understood today. We will use a systematic process to identify the most influential models of reflection to ensure the representativeness of the resulting model. This will strengthen the resulting model with greater exhaustiveness and face-validity.

3. Discriminative ability

The discriminative ability of a definition can be understood as its diagnostic ability to the question: *is reflection present?* This means being able to use the definition to determine clearly and reliably whether reflection is fully present, partly present, or absent, and the reasons for one or the other. This is necessary because any gain in representativeness in the conceptualization of reflection comes with potential loss in its precision. To minimize this possibility, exhaustiveness of elements in the construct of reflection will need to be counterbalanced by discrimination of what is *consistently required* from what is *useful and ancillary*—but not mandatory—in reflection. This will allow reflection to be very richly described and analyzed, while keeping its essential features easy to diagnose.

4. Context-independence and content-independence

It has already been mentioned that the *definition* of reflection should not be driven by its context or relations with other concepts such as experience; this can be prevented by defining reflection

intrinsically rather than extrinsically. But in addition to not being defined *by* its context, the definition of reflection should not even include any unneeded reference to context or content. Although all processes are inherently context-bound and content-bound, their definitions and models should seek to be as generic as possible, in order to be adaptable enough to account for all situations where these processes could occur. As an example, reflection does occur in time—before, during, or after action— and can be *described* with regards to timing; but it should not be *defined* in such fashion. We will aim for a definition that precludes all unnecessary content or context constraints; reflection as conceptualized will be amenable to application in as many fields of study and professional practice as possible, independent of timing, level of training, or other contexts.

5. Operationalization

Perhaps the most important criterion for defining reflection is its operationalization. A fellow pragmatist philosopher of Dewey, William James remarked that the “pragmatic method [...] is to try to interpret each notion by tracing its respective practical consequences.”⁶⁵ Accordingly, a definition or model will serve its purpose in its capacity to be operationalized in practice. There must be “some practical difference that must follow from” defining reflection in a manner rather than another. To be useful, a model must aim for maximum clarity and conciseness to be easily translatable to real-life circumstances. Reflection and its inner structure must be delineated in a way that strikes the right balance between intricacy that enhances reflection and intricacy that overburdens it and makes its application troublesome.

Using these five criteria, we hope to be able to produce a “meta-definition” and conceptual model that will be structure-driven, representative, context/content-independent, discriminative, and operational. We believe that the resulting modeling of reflection will positively guide further studies and applications of reflection along more common grounds and bring us nearer to obtaining empirical evidence of its effectiveness.

Methods

With the set objective of coining a new definition and model of reflection directed by the five previously described criteria, we first identify the most important theorists of reflection by conducting a systematic review of the literature. We follow by extracting the main conceptualizations of reflection and perform a thematic analysis process to resolve and

discriminate essential from ancillary features of reflection. Finally, we structure and reword the different components of reflection to develop our definition and model of reflection.

Systematic review

To provide our process with greatest representativeness of conceptualizations of reflection, we conducted a systematic review of the literature using Medline, Embase, and PsycINFO (Ovid interface) with [*reflection, reflective or reflective practice*] AND [*learning, professional practice, and medical education*] as keywords, for articles pertaining to reflection in education. To sample the most contemporary *application* of reflection, we limited the query to papers published in English from 2008 to 2012. We screened papers obtained to retain only those that included a discussion on the definition of reflection. Of the 430 results obtained, 72 articles (18 reviews) included such discussions. From these papers, we extracted references to 74 distinct authors each with their unique conceptualization of reflection.

As a way to objectively quantify the relative importance of each author on the *current* understanding of reflection, we determined the number of times each was cited by the 72 papers. Using this total number of citations as a measure of influence, we kept the fifteen most influential for further analysis. Unsurprisingly, Schön and Dewey were the most often cited theorists of reflection (all 72 articles referred to Schön and 44 to Dewey). Although the number of citations per author varied (ranging all 72 articles citing Schön's to 8 citing Atkins and Murphy), our goal was to obtain a wide range of influential conceptualizations for analysis and reach saturation rather than to compare the relative influence of each author.

The articles and works of each fifteen author was reviewed to extract a definition of reflection. If no explicit definition existed, we extracted the authors' model of reflection or the relevant passages where the concept is discussed. Various conceptualizations of the other identified theorists were also be briefly reviewed to further inform our analysis process. Figure 1, which can be found in article appended below, presents the flow chart for the selection of definitions and models. Table I, also in the article, summarizes the 15 authors and the major definitions and models that were extracted.

Exploratory thematic analysis

With the results from the systematic review featured in Table I, we conducted an exploratory thematic analysis. As reported by Creswell, this consisted of iterative explorations of the data with comparison and refinement of identified categories.⁶⁶

At the first stage of exploration, two broad categories were identified: thinking processes and qualifiers of thinking processes. The qualifiers were further clustered, and this second stage of analysis identified seven categories encompassing the elements of reflective thinking processes. In naming these categories emphasis was placed on ensuring maximal context and content-independence in labelling. The identified categories were: content, process, self, change, conceptual frame, trigger, and context of reflection.

Development process of definition and model

Pursuing the analysis process, we established which of the seven elements were *constitutional* to reflective thinking and thus warranted inclusion in a definition of reflection. To adequately define the construct of reflection, the following criterion was used: constitutional elements *transform* thinking processes and *make them* inherently reflective, while extrinsic elements *influence* thinking processes *without necessarily making them* reflective. We identified five constitutional elements (content, process, self, change, and conceptual frame) and two extrinsic elements (trigger and context).

Following further analysis, we recognized that three constitutional elements were related to both the content and process of reflection (i.e., the other two constitutional elements). We thus better isolated each constitutional element by reorganizing and rewording them into five distinct *core components*, which we used to frame our draft definition. To obtain the final wording, we conducted iterative refinements to formulate an increasingly generic, nonlinear, integrative, discriminative, and operational definition. To construct our model, we analyzed the interactions between core components; these were outlined and supplemented with the extrinsic elements. Figure 2, presented in the article, summarizes the exploratory thematic analysis and development process of our definition and model.

Article

The article *What is reflection? A conceptual analysis of major definitions and a proposal of a five-component model* is included in this master's thesis.⁴⁸ It has been published in the peer-reviewed *Medical Education* in volume 48, issue 12 in December 2014.

The paper reports on the research process, its main findings and implications. As first author, I was involved in all parts of the study and redaction process. I conducted the literature review, conceived the design of the study, extracted and analysed the data, and drafted the manuscript.

Nicolas Fernandez contributed to the design of the study, extracted and analysed the data, and drafted the manuscript. Thierry Karsenti and Bernard Charlin contributed substantially to the acquisition of data and provided guidance in the writing process.

The authorization of all other authors for inclusion in this thesis was obtained.

What is reflection? A conceptual analysis of major definitions and a proposal of a five-component model

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Keywords: reflection, reflective practice, professional practice, medical education, definition, model

Abstract

Context. Although reflection is considered a significant component of medical education and practice, the literature does not provide a consensual definition or model for it. Because reflection has taken on multiple meanings, it remains difficult to operationalize. A standard definition and model are needed to improve the development of practical applications for reflection.

Purpose. To identify, explore and analyze the most influential conceptualizations of reflection, and to develop a new, theory-informed, and unified definition and model of reflection.

Methods. Using a systematic review, the 15 most cited authors in papers on reflection from 2008-2012 were identified. The authors' definitions and models were extracted. An exploratory thematic analysis was carried out and identified seven initial categories. Categories were clustered and reworded to develop an integrative definition and model of reflection, which feature core components that define reflection and extrinsic elements that influence instances of reflection.

Results. Following our review and analysis, five core components of reflection (TA, ACEI, CF, VC, S) and two extrinsic elements were identified as characteristics of the reflective thinking process. Reflection is defined as "the process of engaging the self (S) in attentive, critical, exploratory, and iterative (ACEI) interactions with one's thoughts and actions (TA), and their underlying conceptual frame (CF), with a view to changing them and a view on the change itself (VC)." Our conceptual model consists of the defining core components, supplemented with the extrinsic elements that influence reflection.

Conclusion. This article presents a new theory-informed five-component definition and model of reflection, which we believe have advantages compared to previous models to help guide further study, learning, assessment, and teaching of reflection.

Introduction

Since first coined by Dewey in 1933,¹ reflection has gained traction in multiple disciplines and professional fields.²⁻⁵ Medicine,⁶⁻⁸ nursing,⁹⁻¹¹ and the other health science professions¹² are no exception, where reflection is viewed as a crucial component of curriculum and practice,¹³⁻¹⁵ and as a requirement for life-long personal and professional learning.¹⁶ In the last 80 years, reflection has been the subject of inquiry, development, and interpretation by many influential authors, notably Schön, and his coining of reflective practice.¹⁷ As evidence of its popularity, reflection has taken on divergent meanings and has been represented by a number of models,^{6, 7} each emphasizing different elements required in reflection (e.g. “active, persistent and careful consideration of any belief,”¹ “affective activities”¹⁸, assumptions,^{17, 19} or “meanings in terms of self”²⁰). For both newcomers and experts, reflection is a complex construct, for which the literature does not provide a consensual definition.²¹⁻²⁴

The lack of a common explicit understanding of reflection has undoubtedly impeded the development of practical methods to analyze, teach, and assess it.^{25, 26} Despite the increasing number of publications on reflection, the evidence in support of its use remains mainly theoretical,⁷ largely due to the difficulty in reliably operationalizing a construct without a consistent definition.^{27, 28} While practical applications of reflection have been described,²⁹⁻³¹ the imprecise understanding of reflection has often resulted in its meaning being diluted, and at times equated to simple thinking.^{32, 33} A standard definition of reflection is needed to help guide further studies and applications for learners, teachers, and researchers, along common grounds.^{28, 34}

Purpose

Previous researchers have published excellent systematic reviews on the general concept of reflection in medical education.^{6, 7} A few have attempted to specifically clarify the *definition* of reflection,^{3, 35, 36} without using a formal systematic process having the set aim of providing a unified definition. Because multiple models and definitions of reflection are currently in usage, widespread acceptance of yet another conceptualization of reflection can only be achieved by accounting for the major ones previously described. To that effect, this article first presents a systematic review of major definitions and models of reflection. We identify their common underlying structure and reorganize their key elements to develop an integrative “meta-definition”. We finally supplement our definition with a conceptual model and discuss their strengths, limitations and implications.

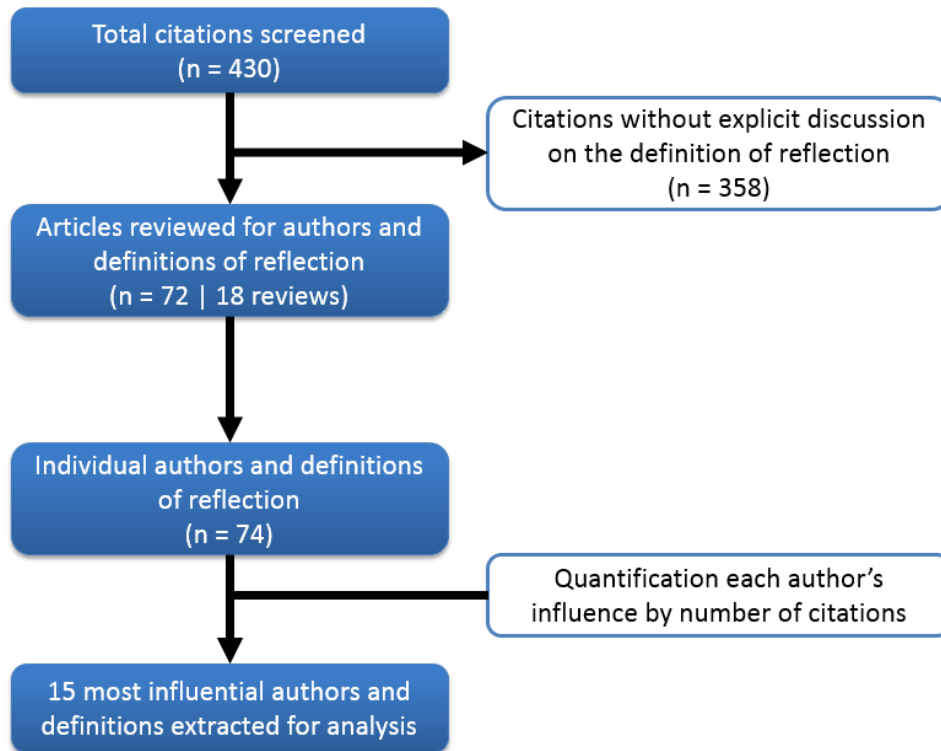
Methods

Definition and model retrieval and extraction

We conducted a systematic literature review using Medline, Embase and PsycINFO (Ovid interface) with [*reflection, reflective or reflective practice*] AND [*learning, professional practice, and medical education*] as keywords, for articles pertaining to reflection in education. We limited the query to papers published in English from 2008 to 2012. Of the 430 results obtained and screened, 72 articles (18 reviews) included discussions on the definition of reflection. We extracted references to 74 authors from these articles and retained the 15 most frequently cited authors. Although the number of citations per author varied (ranging from 72 articles citing Schön to 8 citing Atkins and Murphy), our goal was to obtain a wide range of influential conceptualizations for analysis rather than to compare the relative influence of each author. Figure 1 presents the flow chart for the selection of authors and definitions.

QDN reviewed the articles and works of authors to identify a definition of reflection; when none was available, QDN and NF extracted the author's model of reflection or the relevant passages where the concept is discussed. Table I summarizes the 15 authors and the major definitions and models extracted.

Figure 1. Flow chart for the selection of definitions



Exploratory thematic analysis

Using the results in Table I, QDN conducted the thematic analysis process. This consisted of iterative explorations of the data with comparison and refinement of identified categories.³⁷ At each stage, results were examined by QDN and NF, and any difference of understanding was discussed with all authors to achieve resolution.

At the first stage of exploration, two broad categories were identified: thinking processes and qualifiers of thinking processes. The qualifiers were further clustered, and this second stage of analysis identified seven categories encompassing the elements of reflective thinking processes. These were: content, process, self, change, conceptual frame, trigger, and context of reflection.

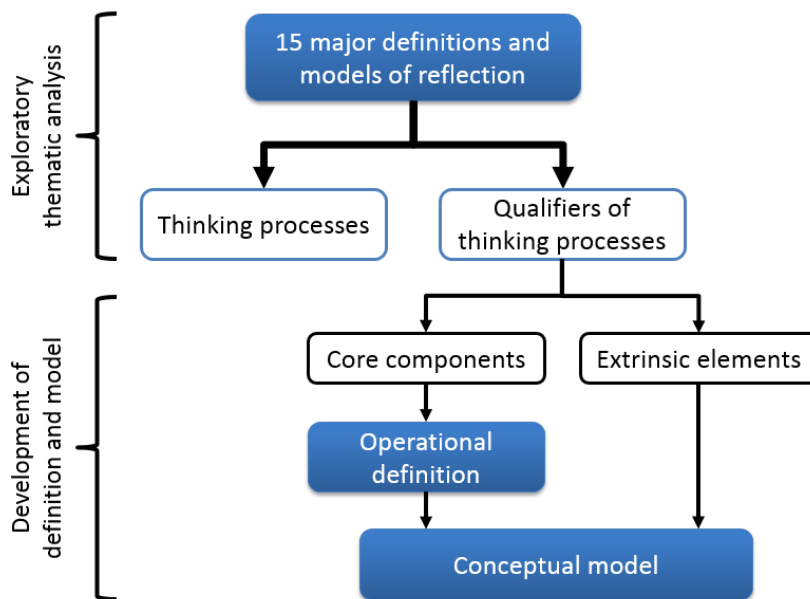
Development process of definition and model

We established which of the seven elements were *constitutional* to reflective thinking and thus warranted inclusion in a definition of reflection. The following criterion was used: constitutional elements *transform* thinking processes and *make them* inherently reflective, while extrinsic elements *influence* thinking processes *without necessarily making them* reflective. We identified

five constitutional elements (content, process, self, change, and conceptual frame) and two extrinsic elements (trigger and context).

Following further analysis, we recognized that three constitutional elements were related to both the content and process of reflection (the other two constitutional elements). We thus better isolated each constitutional element by reorganizing and rewording them into five distinct *core components*, which we used to frame our draft definition. To obtain the final wording, we conducted iterative refinements to formulate an increasingly generic, nonlinear, integrative and operational definition. To construct our model, we analyzed the interactions between core components; these were outlined and supplemented with the extrinsic elements. Figure 2 summarizes the exploratory thematic analysis and development process of our definition and model.

Figure 2. Exploratory thematic analysis process and development of definition and model



Results

Table I presents the 15 most cited authors and their definition or model of reflection. This aggregate view of reflection reveals both commonalities and discrepancies. Apart from the inevitable variety of wording, major differences between the definitions include (i) the concepts that each author included or excluded, and (ii) the level of detail and contextualization of the concepts. By breaking down each definition into its basic concepts, we reconciled these

differences to construct a unified definition of reflection, without oversimplifying or stripping it of its meaning.³⁸

Table 1. Major authors and their definition or model of reflection

Author	Year	Definition or model
Dewey ¹	1933	“Active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends.”
Argyris and Schön ^{39, 40}	1974, 1978	Double-loop learning “occurs when error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies and objectives.”
Schön ^{17, 41}	1983, 1987	“Questioning the assumptional structures of knowing-in-action” and thinking “critically about that thinking that got us to fix this opportunity.”
Boyd and Fales ²⁰	1983	“The process of internally examining and exploring an issue of concern, triggered by an experience, and which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective.”
Kolb ⁴²	1984	Reflection is conceptualized as one stage and pole of the four-stage cycle of Kolb’s experiential learning.
Boud, Keogh, Walker ¹⁸	1985	“Generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation.”
Korthagen ⁴³	1985	ALACT model “1. Action 2. Looking back at the action 3. Awareness of essential aspects 4. Creating alternative methods of action 5. Trial”
Brookfield ¹⁹	1990	A process comprising three interrelated phases: “1. identifying the assumptions that underlie our thoughts and actions; 2. scrutinizing the accuracy and validity of these in terms of how they connect to, or are discrepant with, our experience of reality; 3. reconstituting these assumptions to make them more inclusive and integrative”
Mezirow ⁴⁴	1991	“The process of critically assessing the content, process, or premise(s) of our efforts to interpret and give meaning to an experience. [...] Premise reflection involves us becoming aware of <i>why</i> we perceive, think, feel or act as we do and of the reasons for and consequences of our possible habits.”
Atkins and Murphy ⁹	1993	“1. Awareness of uncomfortable feelings and thoughts; 2. Critical analysis of feelings and knowledge; 3. New perspective.”
Hatton and Smith ⁴⁵	1995	"Deliberate thinking about action with a view to its improvement."

Moon ⁴⁶	1999, 2004	"A form of mental processing with a purpose and/or anticipated outcome that s applied to relatively complex or unstructured ideas for which there is not an obvious solution."
Kember ^{47, 48}	2000, 2008	Reflection and critical reflection are viewed as two levels on a four-scale continuum of reflective thinking. Reflection "operates through a careful re-examination and evaluation of experience, beliefs and knowledge" and "leads to new perspectives;" Critical reflection, the highest level of reflection, "involving perspective transformation," "necessitates a change to deep-seated, and often unconscious, beliefs and leads to new belief structures."
Mann, Gordon, MacLeod ⁷	2009	"Purposeful critical analysis of knowledge and experience, in order to achieve deeper meaning and understanding."
Sandars ⁶	2009	"A metacognitive process that occurs before, during and after situations with the purpose of developing greater understanding of both the self and the situation so that future encounters with the situation are informed from previous encounters."

The definition of reflection

The nature of reflection: Reflection as a thinking process

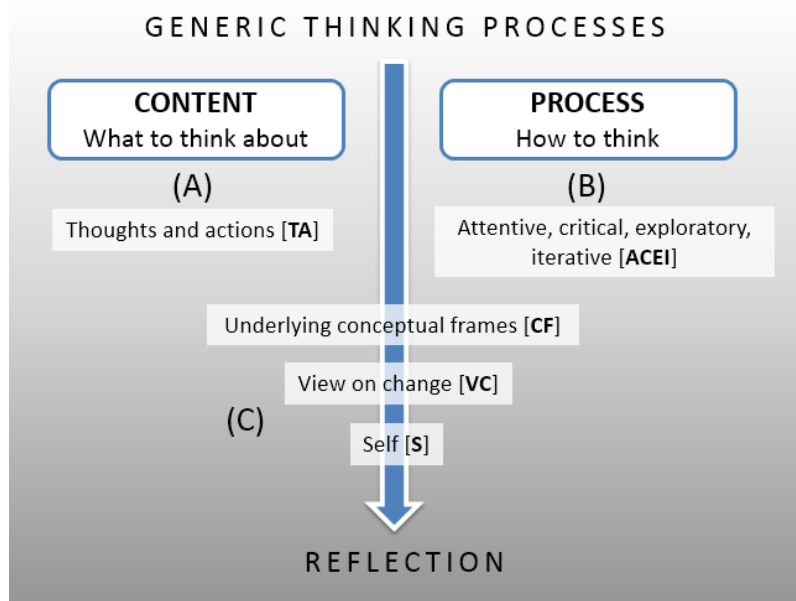
The early stages of the thematic analysis revealed that the nature of reflection, common to all the reviewed definitions, is first and foremost a thinking process. Dewey, who is considered the father of reflection, conceived of it as a distinct and specific form of thinking, rooted in the scientific method.³⁶ For other authors, the act of reflection is seen as "questioning," "thinking," "examining," "scrutinizing," a "mental processing," or "analysis," all of which are cognitive activities. However, that reflection is a thinking process does not mean that reflecting and thinking are synonyms. All definitions of reflection include further elements that delineate how reflection, as a *specific* form of thinking, differs from other thinking processes. We identified seven such elements and classified five as *constitutional* to reflective thinking and two as *extrinsic* to it.

The five core components of reflection

After re-analysis and rewording to better differentiate them, the five identified constitutional elements yielded the *core components* of reflection: (i) thoughts and actions (TA), (ii) attentive, critical, exploratory, and iterative processes (ACEI), (iii) the underlying conceptual frame (CF), (iv) the view on change (VC), and (v) the self (S). These components are the key attributes that allow a thinking process to become reflective.

At their most basic, all thinking processes involve some form of content that is processed. Hence, if reflection is a distinct form of thinking, it must differ by its *content* (i.e., *what* one thinks about when reflecting) and/or by its *process* (i.e., *how* one thinks when reflecting). Accordingly, we classified the five core components in terms of (A) content, (B) process or (C) both content and process, as shown in Figure 3.

Figure 3. The five core components of reflection



(A) Content-related component of reflection (TA)

The first core component we identified, thoughts and actions (TA), is related to the content of reflection, or “what must one think about in order to be reflecting?” The definitions do not provide a consistent answer to this question: “beliefs,” “experiences,” “knowledge,” “action,” “situation,” or “ideas”. The level of precision in descriptions of the content of reflection varies widely, from Boyd and Fales’ broad “issue of concern” to Schön’s specific “assumptive structures of knowing-in-action.” There is no easy way to integrate these divergent views, except to argue that one’s “thoughts and actions” (TA) would encompass the entire range of content on which one can reflect. The TA component is meant to include cognitive content (e.g., knowledge, ideas, problem-solving), non-cognitive content (e.g., actions, experience), and potential affective content. In Mezirow’s words, it encompasses all that one can “perceive, think, feel or act.” Thus, the first component of reflection is thinking about thoughts and actions. While it is true that reflective thinking involves thinking about thoughts and actions, such a stripped-down

understanding of reflection does not distinguish it from other forms of thinking. Additional components are required to delineate what is specific to the reflective thinking process.

(B) Process-related component of reflection (ACEI)

How must one think about thoughts and actions in order to be reflecting? The second component of reflection, the attentive, critical, exploratory, and iterative component (ACEI), refers to the *process* of reflective thinking. For Dewey, one's thinking should be "active, persistent and careful." For Schön, Mezirow, and Mann et al., reflective thinking should be "critical." Boyd and Fales and Boud et al. highlight the exploratory aspect of reflection. It is more important to recognize that reflective thinking entails a certain analytical and ameliorative way of processing one's thoughts and actions rather than to pinpoint *the* exact, specific way. Because each author has his or her preference, we contend that a better approximation is that reflective thinking must be attentive, critical, exploratory, and iterative (ACEI). Thinking about our thoughts and actions attentively, critically, in an exploratory and iterative fashion does mirror more concise definitions of reflection, such as Hatton and Smith's "deliberate thinking about action with a view to its improvement". Yet, most definitions are more elaborate, and include three additional components that refer to both the content and the process of reflection.

(C) Content- and process-related components of reflection (CF, VC, S)

An ACEI thinking process about one's TA will inevitably blur the line between content and process. Because content is cognitively processed, it is inevitably transformed into a new state, which becomes hard to categorize as purely content- or process-related. As we discuss below, the last three core components (CF, VC and S) are related to both the content and process of reflection.

The underlying conceptual frame component (CF)

When Dewey asks one to consider "the grounds that support" one's TA, when Schön and Brookfield talk about "assumptional structures" and "assumptions," or Atkins and Murphy talk about "perspectives," they are all referring to a third core component: the conscious or unconscious conceptual frame (CF) that underlies our thoughts and actions. For authors, reflection involves (i) the process of "becoming aware of" this underlying conceptual frame which reveals "why we perceive, think, feel or act as we do,"⁴⁴ and (ii) making this underlying conceptual frame the new content of reflective thinking, by "scrutinizing (its) accuracy and validity."¹⁹ In organizational learning, it is this questioning of the underlying conceptual frame that leads to Argyris and Schön's "double-loop learning." Thus, along with ACEI thinking about TA, reflection

differs from other thinking processes in that it also requires thinking aimed at “one’s *understanding* of the problem [...] rather than aimed simply at trying to solve it.”²⁴ Mezirow (premise reflection) and Kember (critical reflection) considered this thinking “critically about that thinking that got us to fix this opportunity”(in Schön’s words¹⁷) as the highest level of reflection. Thinking about one’s underlying conceptual frame appears to be required for reflection to occur.

The view on change component (VC)

Why does one reflect? The reflective thinking process also differs from general thinking in terms of its purpose. The majority of definitions view the purpose of reflection as leading to some form of change, the most explicit being Boyd and Fales’ definition, whereby reflection “creates and clarifies meaning” and “results in a changed conceptual perspective”. Others use less precise wording, such as “new,” “deeper,” or “alternative.” Having a view on change (VC) is the fourth core component we identified. Mezirow’s consideration of critical reflection as instrumental in his transformative dimensions of adult learning attests to the importance of a view on change in reflection. Analogous to the CF component, the VC component pertains to both the process and content of reflection. The aims of reflection are (i) to process one’s TA and CF in with a view to change (how to think) and (ii) to reprocess this envisioned change as the content of further reflective thinking (what to think about). By viewing how the envisioned change can be changed further, the reflective process can “spiral onwards” (Jay and Johnson³⁸), involving “trial” (Korthagen) and experimentation (Schön¹⁷ and Ross⁴⁹). One should think with the purpose of change in mind to be reflecting.

The self component (S)

Reflection stems from the Latin root *reflexio*- which means “a bending back.” The idea of reflection as a thinking process concerned with the self appears in most definitions in implicit or explicit form. Sandars uses the term “self,” while others use possessive adjectives such as “their” and “our,” or first-person pronouns such as “us” and “we.” Although a thinking process can be ACEI, deal with TA and CF, and aim for a VC, it becomes reflective particularly when these four components are linked to the fifth component, namely the self (S). The less developed models of reflection regard the self component as pertaining solely to the *content* of the reflective thinking process (thinking about oneself or one’s TA). However, as Boyd and Fales make clear, the self component is also linked to the *process* of reflective thinking. When clarifying “meaning in terms of self,” one uses the self to examine how one’s TA, CF, and VC are (i) related to the self and (ii)

informed by the self. There is a significant difference between thinking about something related to the self (where the *content* is related to the self, e.g. *my actions*) and thinking about something *as related* to the self (where the *process* is related to the self, e.g. *what do my actions say about me?*). Reflective thinking should include both.

The operational definition of reflection

Our conceptual analysis has established reflection as a specific thinking process comprising five distinct components (TA, ACEI, CF, VC, S), as shown in the lower portion of Figure 4. After multiple wording refinements, we coined the following final definition of reflection:

The process of engaging the self in attentive, critical, exploratory, and iterative interactions with one’s thoughts and actions, and their underlying conceptual frame, with a view to changing them and with a view on the change itself.

Using this definition and its five core components as an underlying structure, Table II presents the 15 reported definitions and their interrelationships.

Table II. Breakdown of the definitions according to the core components of reflection

Authors	Core components				
	TA	ACEI	CF	VC	S
Dewey	“supposed form of knowledge”	“active, persistent and careful”	“grounds that support it”	“further conclusion to which it tends”	-
Argyris and Schön	-	-	“underlying norms, policies and objectives”	“modification” “corrected”	-
Schön	“knowing-in-action”	“questioning” “critically”	“assumptive structures”	-	-
Boyd and Fales	“issue of concern”	“exploring”	“conceptual perspective”	“creates and clarifies meaning” “changed”	“internally” “in terms of self”
Boud, Keogh and Walker	“experiences”	“explore”	-	“lead to new understanding and appreciation”	“their”
Korthagen	“action”	“awareness of essential aspects”	-	“creating alternative methods of action” “trial”	-

Brookfield	“thoughts and actions”	“scrutinizing the accuracy and validity”	“assumptions that underlie”	“reconstituting” “make them more inclusive and integrative”	“our experience of reality”
Mezirow	“experience”	“critically assessing”	“premise(s)” “why we perceive, think, feel or act” “reasons for and consequences of our possible habits”	“give meaning”	“our”
Atkins and Murphy	“uncomfortable feelings and thoughts” “feelings and knowledge”	“critical analysis”	“perspective”	“new”	-
Hatton and Smith	“about action”	“deliberate thinking”	-	“view to its improvement”	-
Moon	“complex or unstructured ideas”	“mental processing”	-	-	-
Kember	“experience, beliefs and knowledge”	“careful re-examination and evaluation”	“deep-seated [...] beliefs” “belief structures”	“new perspectives” “perspective transformation”	-
Mann, Gordon and MacLeod	“knowledge and experience”	“purposeful critical analysis”	-	“achieve deeper meaning and understanding”	-
Sandars	“situations”	-	“metacognitive”	“developing greater understanding” “future encounters [...] are informed from previous encounters”	“the self”

The extrinsic elements of reflection

Our definition introduces five core components that together define what reflection *is*. But because reflection cannot occur in a vacuum, it is also influenced by certain extrinsic elements, which, although not informative of the *nature* (i.e., definition) of reflection, add to its understanding. Extrinsic elements alter *instances* of reflective thinking processes, but do not alter thinking processes so as to make them reflective *per se*. Considering that they feature significantly

in our model of reflection, we will briefly discuss two extrinsic elements identified in our review (i.e., trigger and context of reflection), along with others reported in the literature.

The trigger of reflection

Boyd and Fales identify the trigger of reflection as being “experience.” As an experience triggers reflection, what is recognized or recalled of the experience is held on as the content to be fed into the reflective thinking process. Because *what is recognized or recalled* of an experience can differ widely from the *actual* experience, the distinction between the trigger and the actual content of reflection is worth emphasizing. The trigger of reflection, what Eraut calls the focus of reflection,⁵⁰ usually pertains to our thoughts and actions (TA), but should also pertain to our underlying conceptual frames (CF), view on change (VC), or view of self (S).

The context of reflection

How reflection unfolds will vary according to innumerable contextual factors such as the academic field, the setting, and so on.³² The most commonly mentioned contextual factor in reflection is timing. In his definition, Sandars specifies that reflection occurs “before, during and after situations.” This mirrors Loughran’s anticipatory reflection⁵¹ (before), Schön’s “reflection-in-action” (during), and his “reflection-on-action”⁴¹ (after). The vast majority of current definitions, studies, and applications of reflection are concerned with reflection that takes place after the situation of interest. However, because reflection varies according to the context, there is an added value in also describing reflection in other contexts as well (e.g., before or during the action).

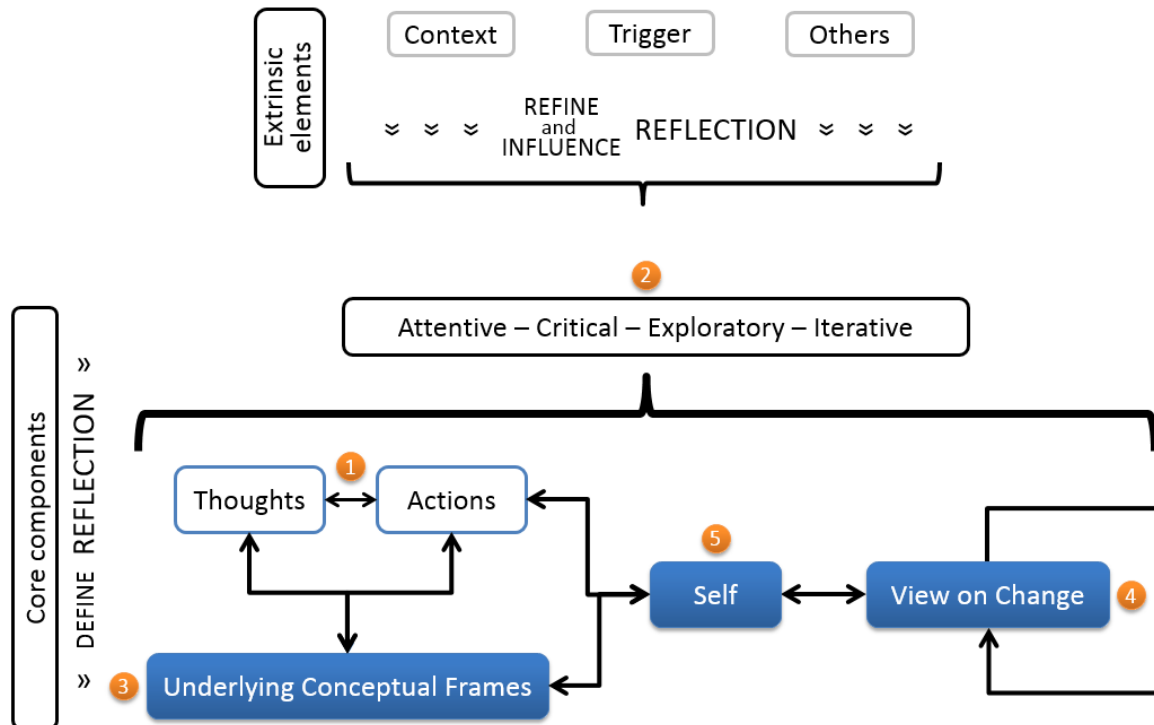
Other extrinsic elements of reflection

Other definitions and models have identified more extrinsic elements characterizing reflection. For example, Mamede and Schmidt’s structure of reflective practice includes an “attitude of openness towards reflection,”⁵² which can be understood as the *state of the person* undergoing reflection. Boud et al. (“affective activities”) and Atkins and Murphy (“analysis of feelings”) describe an *affective* element in reflection, whereas Epstein⁵³ and Tremmel⁵⁴ relate reflection to mindfulness. Both Korthagen and Schön, in more elaborate descriptions, underline the importance and influence of a *facilitator* for reflection. Aukes et al. describe one *outcome* of reflection in medical practice as “the benefit of balanced functioning, learning and development.”¹⁶ This non-exhaustive list of extrinsic elements shows how the conceptualization of reflection can be extensively refined.

A conceptual model of reflection

Our conceptual model of reflection, illustrated in Figure 4, builds on the five above-mentioned *defining* core components of reflection (TA, ACEI, CF, VC, and S) and supplements them with the *influencing* extrinsic elements. It depicts the extrinsic elements as separate external concepts that interact with and refine the core components of reflection.

Figure 4. Conceptual model of reflection



Discussion

Multiple definitions and models currently exist and have contributed to reflection acquiring multiple meanings which we believe have impeded its consensual development. Lest our coining of another conceptualization of reflection will worsen this problem, we first present theoretical strengths and practical benefits of our process of defining reflection and the resulting model, before addressing their limitations and implications.

Theoretical strengths of our process and model

As shown by the numerous models cited in our review, contemporary reflection has come to represent more than any single author has conceived of it; to fully grasp the nature of reflection requires basing our understanding on more than Schön, Dewey, or Boud et al. *independently*. To the best of our knowledge, our article is the first to report on a systematic approach to *define*

reflection, improving on previous analyses based on a single author³⁶ or on multiple authors without systematic sampling.^{3,35} Because our approach was planned with the specific aim to unify the models and definitions, we have developed a new conceptualization that is uniquely integrative and all-encompassing. As shown in Table II, our conceptualization accounts for the key elements of previous models, without emphasizing one at the expense of another. This allows it to serve as a unification model, providing the missing features in other models (e.g., lack of a CF component in Boud et al.'s model and lack of a self component in Dewey and Schön's definition). Furthermore, although more inclusive than previous models, we believe that our proposal strikes a better balance between excessive simplicity (e.g., Hatton and Smith) or complexity (e.g. Brookfield, Kember). Providing a clear distinction between what is the core of reflection and what is extrinsic to it has allowed us to coin a definition that is both representative of preceding ones and discriminant of what reflection truly entails. To facilitate understanding and operationalization, our definition uses generic wording and is self-contained, unlike, for example, Schön's model, which is not easy to grasp without lengthy exploration of his writing.²²

Practical benefits of our model

In the process of becoming more reflective, learners are regularly asked to engage in reflection. Generally unaware—or rather uninformed—of what reflection entails, learners attempt to produce *reflective* thinking, which is often hard to distinguish from any *diligent* thinking. One regularly reads detailed accounts of learners' thoughts and actions (TA component), which are sometimes attentive, critical, exploratory, and iterative (ACEI). Only seldom will learners' spontaneous reflective thinking tackle the underlying conceptual frames (CF), the view on change (VC), and the self (S), which are critical features of reflection. The importance and value of each component of reflection is illustrated in Table III, which shows how thinking processes become increasingly reflective, with increasing power to accelerate learning as each component is added.

Table III. An example of increasingly reflective thinking processes

	Core components:	TA	TA + ACEI	TA + ACEI + CF	TA + ACEI + CF + VC	TA + ACEI + CF + VC + S
Example	Nicolas and issues at work.	Nicolas thinks about issues at work.	Nicolas thinks about issues at work in ways that are attentive, critical, exploratory, and iterative.	Nicolas thinks about the <i>underlying</i> reasons for the issues at work in an ACEI way.	Nicolas thinks about the issues at work and the underlying reasons them in an ACEI way, and tries to resolve both the issues and the underlying reasons.	Nicolas thinks about <i>his</i> issues at work and the underlying reasons. He thinks about what these say about him and how they relate to him. He does so in an ACEI way in order to change the way he behaves and works.

Because our model explicitly describes the structure of reflection and its core components, it can be used as a basis to teach richer and more effective reflection. By including and focusing on all five core components in their reflective thinking, learners can experience fully developed reflection and clearly distinguish it from diligent thinking or generic metacognitive thinking.⁵⁵

Although reflection can be broken down into components, this does not mean that reflection can be equated to the sum of its parts. Even if all the components are present, reflection will unleash its full potential only when the systemic components interact. The most significant interaction is the reciprocity between one’s TA and their CF, which the reflective process should promote. This uniquely human capacity to “think inside the box” (thinking about our TA) and “outside the box” (thinking about the CF underlying our TA) is instrumental in fostering high-level reflection and in changing one’s way of being, doing, and thinking. Similarly, analyzing how the self explains and influences (or is influenced by) our thoughts and actions and our conceptual frames is undoubtedly key for effective reflection. Because reflection comprises both the individual components and the many interactions between them, it is easy to see how nonlinear, complex, subjective and potent it can become, and why reflection can be so hard to assess and teach.

By distinguishing the core components from the extrinsic elements, our model allows reflection to be *informed* by the extrinsic elements, without being bound to them. Reflection thus remains universally applicable and understandable independent of context. Reflection, in our model, can involve any discipline, any medium (e.g., portfolios, oral sessions), any timing (i.e., before/in/after action), and so forth. It can draw on affective content, as Boud et al. have suggested if appropriate,¹⁸ or can forgo it if not. By pinpointing its fundamental components, and by prescribing only those, our definition allows reflection to assume many different forms without diluting its meaning.

Limitations of our process of defining reflection

To achieve a manageable dataset for analysis, we first retrieved definitions reported by major authors, and extracted an author's model only when no definition was obtained. Whereas every effort was made to ensure accurate representation, we acknowledge that the excerpts presented in Table I might be considered condensed or fragmentary. This is a telling example of the difficulties encountered when seeking to understand reflection. Additionally, inherent to any qualitative analysis, a risk of bias in interpretation exists. To lessen this possibility, results were discussed at each research stage, and any disagreements were outlined and resolved. While recognizing these limitations, we believe these shortcomings in retrieval or analysis have not significantly impacted our proposed definition of reflection, as the key *defining* features of authors are accounted for. Furthermore, whereas our definition is considered comprehensive, our model voluntarily allows for the unmentioned elements of other models to be integrated as "other" extrinsic elements, as shown in Figure 4.

A few implications of our model

Professional development and autonomy

Schön viewed reflection as a primary way for practitioners to learn in practice.¹⁷ Of the various means of learning, reflection has earned a prominent place in the pedagogy of professional disciplines. We believe that the popularity of reflection is partly attributable to the autonomy it affords. Because professional practice *per se* entails the notion of autonomy, professionals should learn in ways that foster autonomy. By placing the self component at the center of the reflective process, our model of reflection clearly focuses on autonomous practice. And whereas our model prescribes five components of reflection, it allows substantial leeway in the content within these components. One's reflection and the resultant learning can be as deeply personal and

autonomous as one's practice. And because reflection is grounded in one's unique conceptual frame, any operationalization of reflection must take into account its inherent subjectivity.

Assessment and teaching

Our model of reflection has implications for its assessment and teaching. First, because reflection comprises five components, it cannot be fully assessed in a monolithic, one-dimensional manner from non-reflective to reflective, as most scales do.^{30, 31, 47, 56} Our model allows a more in-depth understanding of reflection through separate understanding of each component and their interactions. For example, one might think in an attentive, critical, exploratory, and iterative fashion without ever thinking about one's underlying conceptual frame. Whereas a one-dimensional assessment of reflection would not distinguish a functioning ACEI component from an absent CF component, a multi-dimensional scale would, and would therefore have the ability to inform the personalized teaching and development of reflection.

Second, due to the multi-component nature of reflection, its assessment should not be simply dichotomized into "reflective" and "non/pre-reflective."⁵⁷⁻⁵⁹ Whereas the most mature and powerful form of reflection involves all five components, this does not mean that any thinking short of that is unreflective. Instead, we prefer to think of reflection as a continuum, with many degrees of development for each component. Teaching the art of reflection means moving towards full reflection.

Third, by clearly defining reflection irrespective of timing, our model can be used to assess and teach both reflection-*in*-action and reflection-*on*-action, unlike other models or applications of reflection such as reflective writing, which concerns mainly reflection after the action.

Finally, because reflection is explicitly conceptualized as a process, without reference to any predetermined extrinsic outcome, we believe that our model will help prevent the error of teaching and assessing the *outcome* of an instance of reflection (what—the content—we want one to learn) rather than its *process* (how to learn). As Kolb has said of learning,⁴² reflection is a process, not an outcome. When assessing reflection, we should not measure the final destination of reflection or the distance traveled using it, but rather the reflective journey itself, as conveyed by the five core components.

Conclusion

Through a systematic and unified analysis of the most cited definitions of reflection, we developed a new definition and model. Our operational definition includes five distinct core components (TA, ACEI, CF, VC, S), which distinguish reflection from other thinking processes. Our model of reflection supplements the core components with extrinsic elements that inform and refine instances of reflection.

In light of the aforementioned strengths, benefits, and limitations, we propose that our conceptualization, rather than amplifying the problem of lack common understanding and applications of reflection, may serve as a current meta-definition and meta-model to provide a sound framework for understanding and operationalizing reflection.

In Kurt Lewin's thoughtful words, there is nothing as practical as a good theory. Ultimately, the usefulness and validity of our definition and model will depend on their capacity to inform practical applications. Although our understanding of reflection will certainly evolve with further research, we hope that the process we have here described brings us closer to developing more comprehensive learning, teaching and research about reflection.

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Further discussion

In this section, we wish to explore and expand the discussion featured in the article. We start by examining other methodological limitations in our research process. Added explanations and appraisal of our definition and model follow. We then discuss some other theoretical and practical implications our conceptualization has. Finally, proposals of further avenues of research conclude the supplementary discussion.

Methodological considerations and limitations

Query and selection of articles

As is reported in the *Methods* section, to obtain the raw data used in the thematic analysis, we needed to identify the definitions and models of reflection that drive our current understanding of it. To achieve this, we first reviewed all articles published on the subject of reflection in medical education between 2008 and 2012. Most of these papers reported on an *application* of reflection. From these papers (n=430), we sought to identify the *definitions* of reflection that these paper referred to in order to identify the most influential. Of the 430 articles, 72 provided a clear reference to one or multiple theorists (and their definitions) of reflection; the relative influence of each of the 74 identified theorist was quantified by the total number of citations they obtained (the 15 most influential were kept for our analysis).

The query and selection process raises two significant issues. First is the short and arbitrary five-year timeframe for the search, which could have omitted more recent (or older) papers with enlightening models of reflection that could have better informed our conceptual analysis. Second is the questionable assumption of quantifying influence solely by the number of citations. Citations do not always amount to sanctioning, and papers can be cited because of inadequacy or controversy. Also, it might be incorrect to assume that a more frequently cited models is a superior one.

It is true that our systematic search might have missed papers with informative models and that our measure of influence has caveats. Nonetheless, we hold that these issues have not unduly biased our process. With regards to the short timeframe of the search, it is important to reiterate that the goal of the search was not to identify papers which *presented* models of reflection, but to identify—and quantify—*references* to models already described—and influential— in the literature. Extending the timeframe would probably not have changed the identified influential theorists and models. In addition, we wanted to create a model of reflection that would gain

widespread recognition by being based on the most important theories of reflection in use. It can be argued that the inclusion of novel but less consensual models of reflection in our analysis might have generated excessive complexity and deterred us from our objective. We accepted the possibility of leaving out more intricate models of reflection, gaining in consensus what is lost in granularity.

Regarding the quantification of influence by number of citations, we contend that although imperfect, it remains the most pragmatic way of ordering the 74 theorists we identified to retain a manageable number (n=15) for our conceptual analysis. The validity of each citation was checked and all were citations to models and definitions of reflection that were used in the papers, not citations to their inadequacy. While it is true that the frequent citation of a model does not necessarily translate into its superiority, it does mirror its greater acceptance and adoption, both of which are good selection criteria for inclusion of a model in a thematic analysis towards a result that is also aimed at achieving acceptance and adoption.

Ontological considerations

To create our model of reflection, we exclusively analysed theories of reflection. In our research process, we did not have recourse to any empirical analysis of reflection. Despite a purely theoretical process having its benefits, the lack of inclusion of any empirical data also raises inevitable vulnerabilities, both of which will now be discussed.

Benefits of a solely theoretical process

We have stressed that the construct of reflection is currently conceptualized in multiple discrepant theoretical forms. All the more manifest is that reflection has been operationalized in a still greater number of discrepant forms in practice.^{31, 35} The existence of myriad applications of reflection pose a tremendous challenge for any attempts to summarize and unify their theoretical basis. Moreover, because it is impossible to ensure that all purportedly reflective applications refer to a shared theory of reflection, doing so with any sense of coherence might be impossible. It also needs to be emphasized that the primary goal of our study was to coin new definition and model of reflection which are *de facto* abstractions stemming from the concrete phenomena of reflection. Hence, even if there is a loss of information in excluding empirical particulars of reflection, this loss of information might in fact be valuable by pruning the superfluous while retaining—and thus extracting—the core meaning of reflection.

By including and analysing the conceptualizations of the 15 most influential theorists to create ours, we delegated to them the task of extracting the essence and definition of reflection from the experience and application of reflection. Although we could have carried out this translation from the practical to the theoretical ourselves, it would have been to the expense of the multiple perspectives afforded by inclusion of 15 theorists. Instead, by concentrating our efforts on unifying the multiple theoretical perspectives—and not creating one of our own—we obtained a much more diverse, rich, and robust analysis of reflection. We see further and more clearly by standing on the shoulder of giants than through our own dwarf eyes.

Vulnerabilities of a solely theoretical process

Our research process can be regarded as a qualitative meta-analysis: we systematically identify, analyse and integrate previous models to create a new “meta-model.” As is the case with all meta-analysis, the quality of the end result will be tributary of the quality of the included studies. Had we included conceptualizations of reflection that were misconceived by their theorists (one first vulnerability), the resulting model would undeniably also be misconceived. Garbage in, garbage out. But arguing such a case would be almost untenable in light of the 15 authors that we have reported. To refute the conceptualizations put forth by Schön, Dewey, Boud et al., and the like would almost be tantamount to refute the construct of reflection itself.

But ensuring the adequacy of the included models does not ensure that the process of analysing them is also adequate. The first issue related to analysis is the difficulty in extracting the definition and model from the works of the theorists which we have already discussed in the article. By definition abstract and synoptic, definitions and models that we analysed could be considered by some an incomplete or fragmentary appreciation of the exhaustive theorisation (second vulnerability). The second issue related to analysis is that unlike *bona fide* meta-analyses—albeit themselves not immune to criticism—which manipulate quantitative data as in the biomedical field, ours involved qualitative data. As words and concepts cannot be manipulated as numbers and statistics are, there is an inherent risk that our synthesis of the identified models could be inadequate (and as a consequence, also our definition and model—third vulnerability).

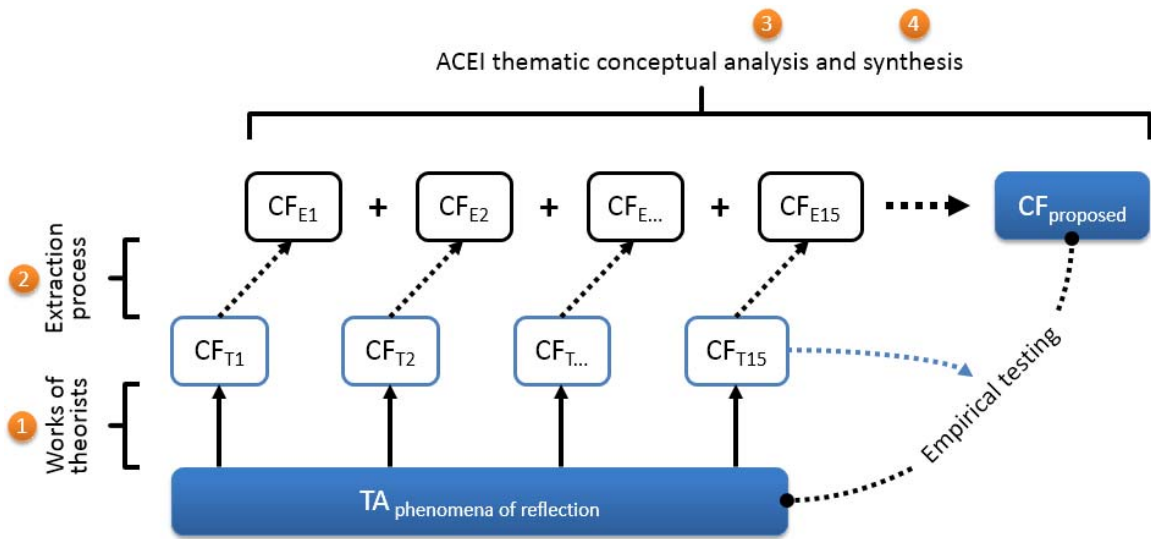
Another more fundamental cause is the unifying process itself (fourth vulnerability). It can be argued that true meaning can hardly be reducible to a simple sequence of words and that common words might have differing meaning in each author’s differing context. And consequently that even if Table II shows that our proposed unified definition elegantly

encompasses the *definitions* or *models* of 15 major theorists of reflection, it might not genuinely encompass their original *meanings*. As it is impossible to provide any indisputable proof for or against this argument of theoretical validity, what is more relevant is to determine if the unified definition has meaningfulness in its usage and application, that is, if it has validity *in practice*.

The question of the validity in practice of our model of reflection

To repeat the thoughtful words of Kurt Lewin which we quoted in the conclusion of our article, there is nothing as practical as a good theory.⁵³ In other words, the definitive test of validity for our model of reflection is not its theoretical validity with regards to other models, but its capacity to comprehend, guide, and inform practice. To use our model of reflection (presented in Figure 4) as a metaphor, what we need to establish is if our proposed underlying conceptual frame (CF) for reflection (i.e., the model of reflection we propose) is congruent and accurate with regards to the thoughts and actions (TA) of reflection (i.e. the phenomena of reflection). Continuing with this metaphor, our research process consisted in the analysis and synthesis—in an attentive, critical, exploratory, and iterative (ACEI) process—of fifteen conceptual frames of reflection (described by its 15 most theorists) to devise our own CF of reflection. Thus, what needs to be tested is if this newer CF is far removed from the actual TA of reflection or—hopefully—a better conceptualization of it. Figure 5 conceptualizes our research process through the lens of the TA, CF, and ACEI core components, and identifies diagrammatically the potential vulnerabilities that have been discussed.

Figure 5. Conceptual representation of our research process and its vulnerabilities



ACEI: attentive, critical, exploratory, and iterative | CF: underlying conceptual frame | CF_T: underlying conceptual frame of theorists | CF_E: underlying conceptual frame as extracted | TA: thoughts and actions | the orange circles identify vulnerabilities in research process

The more habitual process of delineating and validating the construct of reflection involves starting with the phenomena (TA) of reflection to construct a model (CF) and then test or validate it empirically (TA), usually in a different context. This is shown in Figure 5 by the blue dotted and slightly curved arrow which represents hypothetical testing of the 15th identified model of reflection.

Our process started with 15 models of reflection and obtained one resulting model which now needs to be tested empirically for validity. This is represented in Figure 5 as the link between the CF_{proposed} and the TA_{phenomena of reflection}. Anticipating Lewin, Dewey recognized the unbreakable relationship between theory and practice, which he described in a more general manner as the link between “concrete and abstract thinking.” To him, abstract thinking—the “*theoretical*”—“represents *an* end, not *the* end.”³⁷ Because models of reflection are abstractions from the phenomena of reflection, they cannot be completely disjointed from it without losing all meaning. Thus, measuring the adequacy of our model must be done in practice, in the particulars, *empirically*. Ultimately, the value and validity of our model will be judged by its capacity to represent practice, to be translated into it, i.e., to be operationalized.

Methodological considerations for operationalization

We wish to address one last methodological consideration pertaining to the eventual operationalization and testing of our model. This is the critical and formidable challenge posed by the operationalization of any model. Just as reflection has *already* been operationalized by many in many diverging ways (sometimes while using a common theoretical model), there is a lurking risk of incorrectly operationalizing—and faulting—a perfectly valid model. As such, precautions need to be taken into account when pursuing the translation from theory to practice. For example, we agree with Wass and Anderson that the process of reflection should not be ritualized;⁶⁷ for reflection to fully unfold, it should not be improperly constrained, and reflectors should be allowed considerable leeway. Because our model does report on five essential components for reflection, one might be tempted to operationalize reflection by imposing a sequence or specific steps for each component, which would erroneously reflect our model and

the reality of reflection. But should every application stemming from our model of reflection prove unsuccessful, we would clearly need to be dispute it. If our model repeatedly fails the test of operationalization, it conclusively fails the test of usefulness in practice—and therefore—also the test of theoretical and practical validity. With the goal of operationalizing our model, we discuss a few ideas regarding practical applications and testing of our model of reflection in the last section on *Further avenues of research*.

Further exploration of the model

To complement the results and discussion sections of the article, we now turn to further exploration of our proposed model. We wish to provide a more explicit explanation of the model firstly by appraising and detailing the core components, their essential connections and interactivity; secondly, we address the extrinsic elements and their role in the model.

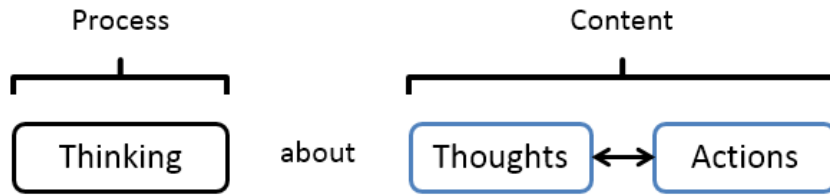
Core components

The first of five key criteria directing our research process was to coin a definition of reflection that would be structure-driven. We thus outlined a definition comprising five core components required in reflection. To better grasp their individual role in reflection, we isolate and discuss each before reuniting them to see how they function together to create reflection.

The thoughts and actions component (TA)

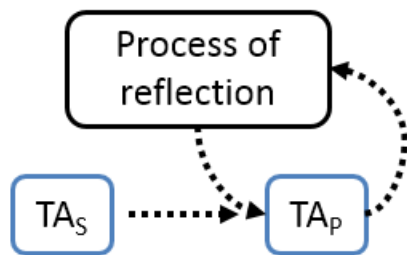
The results section of the article has already reported that reflection is foremost a thinking process and that all thinking processes must involve a content and a process. Indeed, when one is thinking, one mentally represents some form of content which is processed. It is impossible to think about nothing (except about the *concept* of nothing, itself a type of content). The intentionality of thought was already recognized by the Scholastics in the Middle Ages and was restated by psychologist Franz Brentano who noted that “every mental phenomenon includes something as object within itself.”⁶⁸ It is also impossible think about a content (the object of the mental phenomenon) without performing some form of mental operation on that content, be it to look at it, analyze it, scrutinize it, or modify it. It is this content, object, or subject of thinking that we have chosen to label the *thoughts and actions* component. The TA component is meant to be encompassing of all content that one might be present in one’s thinking as Figure 6 shows.

Figure 6. Structure of all thinking processes



Another important point is that TA is usually *only* conceptualized as the *starting* content—the substrate—that is fed in the process of reflection (which involves the four other components of reflection that characterize this reflective process). Yet once the content of the TA component is processed reflectively, it still remains “content” (albeit a different “processed” content) of the reflective process. Thoughts that have been thought about are still thoughts. Thus, this processed content can—and eventually should—be part of the (newer) content that is reflected upon: processed TA is also to be part of the TA component. A corollary is that the starting content of reflection is to be differentiated from the content of reflection *once the process of reflection has started to unfold*; this can be symbolized by TA_s for starting/substrate TA and TA_p for processed TA. Figure 7 presents the relationship between, TA_s , the process of reflection, and TA_p . It also shows how processed TA is iteratively reflected upon to produce further processed TA.

Figure 7. TA_s , process of reflection, and TA_p



If TA is meant to represent the object or content of reflection, why not choose to label it a less restrictive way, for example, simply as the “content” of reflection? The most relevant reason is that we wanted to render explicit the relation between thoughts and actions, the first informing and influencing the latter. Reflection aims to manipulate thoughts to improve on thoughts and also on actions, as represented by the bidirectional arrow in Figure 4 and 6.

Obviously, when one thinks about actions, one is manipulating thoughts, not actions. But since the TA component will more predominantly be viewed as the substrate/starting TA that emerges

from experience, it is not a stretch to view actions as a core part of the content/TA component of reflection. Moreover, Schön would argue (though not all theorists would agree) that in reflection-in-action, thoughts and actions are not as distinct as is usually considered the case.²⁶

The last observation concerning the TA component is related to the discriminative ability of our definition, the third criteria directing our research process. We identified the core components as *transformative* of thinking processes, making them *inherently* reflective. Although we did include the TA component as a core component because it is indispensable—and thus constitutive—to any reflection thinking process, it is evidently also present in *all* thinking process. Even if the presence of a TA component is mandatory in reflection, its presence is not distinctive or discriminant of reflection. All thinking process involves content and no *specific* starting content would make thinking about it inherently reflective. As follows, the TA component is unlike the four other core components which are both mandatory and discriminant of full reflection.

The attentive, critical, exploratory, and iterative component (ACEI)

The ACEI component is unique among the five core component in that it only characterizes the *process* of reflective thinking, not its content. We mentioned in the article that in order to reflect one must think about TA in an attentive, critical, exploratory, and iterative fashion. For reflective thinking to occur, the process of thinking must be *qualitatively* different from habitual thinking. We identified the qualifiers of attentive, critical, exploratory, and iterative as the better approximation of the qualities of the process of reflection that theorists have reported.

Attentive thinking

When thinking reflectively, one thinks in an attentive, “deliberate,” and “careful” way with “awareness” of the thinking that is unfolding. Attentive thinking allows for greater insight in one’s thinking processes, its strengths and flaws. Because thinking, in particular routine thinking, “is peculiarly exposed to error” and “is liable to be influenced by almost any number of unseen and unconsidered causes” as Dewey notes,³⁷ reflective thinking must be attentive to foster the detection of these errors and the correction of their causes.

Critical thinking

In addition to being attentive, reflective thinking must also be critical. This is certainly due to the developmental intertwining of the construct of reflection and critical thinking.⁶⁹ The definitions of Schön,²⁶ Mezirow,⁷⁰ Atkins and Murphy,¹³ and Mann et al.¹¹ explicitly mention the need for

reflection to be critical in order to “maintain a state of doubt and to carry on a systematic and protracted inquiry”³⁷ that to Dewey are the essentials of thinking. It is only when reflection is critical that it can empower the emancipation function that Habermas⁴⁴—and Mezirow⁷⁰ in his footsteps—has described.

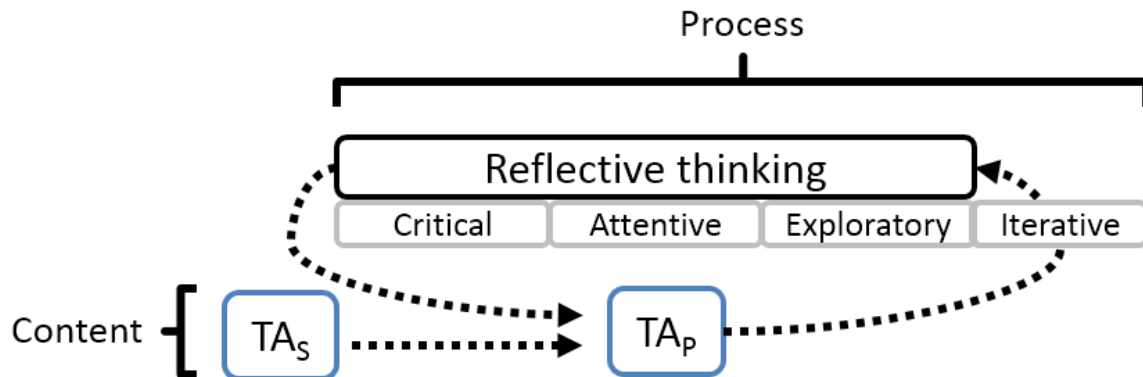
Exploratory thinking

Thinking that is attentive and critical is clearly more conducive to being reflective. But theorists such as Boyd and Fales⁷¹ and Boud et al.²⁸ have also described the process of reflective thinking as involving a form of exploration. Mann also remarks that reflection helps achieve a “deeper meaning and understanding.” The exploratory subcomponent of the ACEI component is related to the view on change (VC) component: for reflection to have a view on change, it must be incorporate a function of development and expansion of the content that is reflected upon. When reflecting, one must analyse the TA component in a way that increases both the breadth and depth of thinking.

Iterative thinking

“Iterative” is the final qualifier of the process of reflective thinking. The etymology of the word reflection bears this idea of iteration: in Latin *re-* has the general meaning of “back” or “again.”⁵ Dewey’s definition uses the word “persistent” to characterize reflection, while the models of Korthagen⁷² and Jay and Johnson⁷³ portray the process of reflection as a cycle. In reflective thinking, the result of the process of reflection (what we have labelled as TA_p) upon the starting content (TA_s) should be reprocessed, either following further cognitive analysis or testing in practice. The latter case mirrors the “trial” described by Korthagen⁷² or Schön’s “experimentation.”²⁶ Reflection is thus a loop that involves progressively richer material and analysis. The iterative nature of reflection and its association with the VC component is shown in Figure 4 by the loop surrounding the VC component. Figure 7 presented a simpler view of the iterative nature of reflection as the loop between the global process of reflection and TA_p. Figure 8 expands Figure 7 to include all four subcomponents of the process of reflection in relation to the content of reflective thinking.

Figure 8. Reflective thinking and the attentive, critical, exploratory, and iterative subcomponents



The underlying conceptual frame component (CF)

Among the five core components, the CF component is probably the most challenging to understand and include in the reflective process. This might explain why it has been sometimes omitted in the theory of reflection and often is in its practice. But to most theorists, what we have identified as the underlying conceptual frame component is absolutely central to reflection. Being central, we will further examine it, firstly by clarifying its nature and secondly by exploring its function and usefulness in reflection.

The nature of the CF component

We have previously described CF as revealing “why we perceive, think, feel or act as we do.”⁷⁰ The CF component is indeed inseparable from the TA component: by *definition* it is the “assumptive structures”²⁶ or “belief structures”⁷⁴ that underlie our thoughts and actions; in other words the “why” that underlies our current understanding of things. Reflection calls for this questioning of the *frame of our thoughts* rather than the *thoughts themselves*. In doing so, there is an implicit acceptance of (i) the existence of a frame or structure—conscious or not—that underlies and is explicative of any form of thoughts and actions, and (ii) that this frame or structure is *not systematically present* in all thinking. Schön posits this by establishing the existence of *knowing-in-action* which differs from the totality of knowledge that one possesses, and *tacit knowledge* which one cannot fully account for, even on demand.^{26, 52} Dewey also accepts this premise by defining reflection as involving the consideration of “knowledge in the light of the grounds that support it.”³⁷

In other fields, a similar form of what we have labelled the CF component can be found under different denominations as schemata⁶⁹ or scripts.⁷⁵ The CF component represents the answer to

“why does one do what one is doing?” and “why does one think what one is thinking?” Put otherwise, it is one’s lens on the world or on a situation in it, one’s cognitive structure comprising a precise set of knowledge, memories, exemplars, experiences, abstractions, etc. that are mobilized in order to organize and find meaning in any specific circumstance.

The function and usefulness of the CF component

The CF component is fundamental in reflection for three reasons. The first is its explicative and transformative power for the TA component. Because the CF component are what underlies our TA, including it in the reflective process fosters more accurate reflection on TA by also requiring reflection on how we came to think and act the way that we did. Dewey has observed that thinking is prone to errors of “past experiences, received dogmas, the stirring of self-interest, the arousing of passion [...]”³⁷ which can be more readily detected when one thinks about the CF and not only the TA. To paraphrase Schön, it is only when one thinks about the CF that one can “frame and reframe” a situation, problem, or understanding to gather a new and more constructive perspective for them. The quote often attributed to Einstein that “no problem can be solved from the same level of consciousness that created it”⁷⁶ is in the same vein. It is only when one critically break the shackles bounding one’s thinking that true emancipation arises.

The second function and usefulness of the CF component in reflection derives from its relation with the TA component. According to Schön, “our descriptions of knowing-in-action [the CF of our TA] are always constructions.” Being constructions, this raises the question of the adequacy of these constructions with regards to TA. In the best of reflections, CF is highly explicative and encompassing of TA. A great deal of one’s reflective ability lies in the ability of mobilizing the accurate CF for the TA at hand. Although it is illusory to believe in practice that the CF can consistently explicate the full of TA, a CF that is more explicative of what has occurred or more predictive of what is to occur is clearly superior. As Dewey noted, “it is a familiar and significant saying that a problem well put is half-solved.”⁷⁷ By singling out the CF from the TA—what was described in the article as thinking aimed at “one’s *understanding* of the problem [...] rather than aimed simply at trying to solve it”—³⁶ it is possible to scrutinize it to identify its missing and erroneous elements. In brief, the usefulness of the CF component lies not only in its function as explicative of the TA, but as an object (i.e., a content) of the reflective process itself which should be looked at in a ACEI manner *in itself* and *in relation with TA*.

The third reason why the CF component is essential stems from its more abstract nature as compared to the more concrete TA. As CF are the cognitive constructions underlying TA, they will usually—though not always—be more conceptual than the thoughts and actions they gave rise to; reflective thinking extracts the more generic features out of the particulars of experience in order to examine the CF behind them. Because of its more abstract nature, CF can empower faster and richer expansion of one’s reflection than if it was solely concerned with the more concrete TA. To use the example featured in Table III, if Nicolas thinks about the underlying reasons for his issues at work, he would much improve his reflection over thinking only about his issues at work. In addition to fostering better reflection, the CF component, by stimulating one’s reflection to be more abstract, also allows the results of reflection to be applicable in more numerous subsequent situations. If one goal of reflection, as Sandars describes, is that “future encounters [...] are informed from previous encounters,”¹⁰ the CF component is crucial in ensuring that the cognitive outcome of a reflection is not so particular and specific that it prevents it from having utility in any other context. Reflection that seeks to clarify and unravel broad rules or principles is more useful than reflection which deals only with individual occurrences or instances.

The view on change component (VC)

We have reported that the VC component is related to the exploratory subcomponent of the ACEI component. Although linked with exploration, the VC component is more explicit in requiring a consideration of *change* to be included in reflection. Whereas exploration of thinking commands broadening of the reflective thinking process (which is a form of change), the view on change component also commands that this broadening include *testing* of this envisioned broadening by (re)viewing it. Not all authors are explicit in detailing the way this testing should happen. Some, such as Korthagen, specifically describe a step of “trial” in reflection that is to occur *in practice* (in action);⁷² others, Dewey for example, rather view this component as a cognitive step in reflection by analysis of “the further conclusion to which it tends”;³⁷ yet others see this testing as rooted in *both* thought and action, as Schön when he speaks of reflection-in-action as “on-the-spot experiment” unfolding in an “action-present.”⁴⁹

Regardless of the precise means of testing, that a form of testing must be present in reflection needs to be stressed. This is essential in ensuring that the reflective process does not prove sterile and that it does provide meaningful change pertaining to thoughts, actions, or both. Also common to all views on the VC component is that it involves testing that translates abstract theorisation in

more concrete contexts. We have mentioned that reflection, in particular by virtue of its CF component, fosters thinking that is removed from the particular; in viewing the validity of the change created by reflective thinking, the envisioned change must be reintroduced into practice (or more concrete thinking) to verify if it can stand up to reality. This interplay between the abstract and the concrete in reflection mirrors Lewin⁵³ and Kolb²⁷ cycles of experiential learning.

The self component (S)

The results section of the article introduced the notion that the self component pertains to the content to be processed (as part of TA) *and* to the process of reflection itself, and that the full reflective process should include the self component in both ways. Further examining this component, we will expand this key notion and expose a few of its consequences.

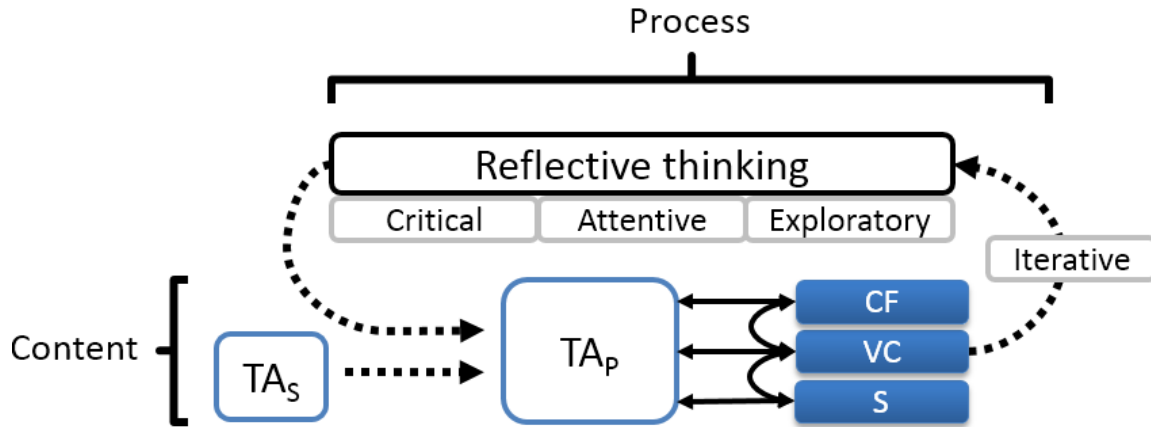
Firstly, it is no surprise that a component of self must be included in any form of thinking. As Dewey mentions, to think for oneself is a truism as one can evidently not think *in lieu* of someone else. Thinking always stems from oneself; in the process of reflective thinking, the self is the *agent* of thinking. And because reflective thinking calls for the other three process-related components (ACEI, CF, VC), this means that all three also stem from oneself. When reflecting, *one* mobilizes *one's* ability to think in an attentive, critical, exploratory, and iterative way, with *one's* underlying conceptual frames, and *one's* own capacity for viewing and testing change.

Secondly, in reflection it is especially interesting that the self is not only the *agent* of thinking, but also its *subject/object* (i.e., the content of reflection). Obviously, *one's* content of reflection can be about *one's* TA. But it can also be about *one's* ACEI ability in thinking, *one's* CF, and *one's* capacity for VC. The self component is thus deeply embedded in reflection as it interrelates with the content, the process, and all other components of reflection. Moreover, the self is present before, during, and after the reflective thinking process.

Thirdly, compounding the key role of the self component in reflection is the reciprocity it allows between the content and process of reflection, and, as a result, the stronger connectedness and sense of self it develops. By cultivating both the self as subject and the self as agent in the long run, reflection improves both our knowledge of self and our process of improving our knowledge of self, which together improves our capacity for actions within and without ourselves. The central location of the self component in our model of reflection in Figure 4 serves to demonstrate its core and commanding importance.

Figure 9 summarizes this section by showing all core components and how they relate to the content and the process of reflection.

Figure 9. The five core components of reflection in relation to content, process, TA_S , and TA_P



Connections and interactions between the core components

After examining the core components individually, we now focus on their interactions to fully explore our proposed model of reflection. Table III gave a first example of how these components can interact to lead to full reflection. Figures 4 and 9 presented the core components and their potential interrelations which we now describe in greater detail.

Reflection as connectedness of core components

A recurring error in the conceptualization of reflection is to concentrate mostly on the *presence* of core components at the expense of the *relationship* between them. Reflection is first and foremost a thinking *process* and it is thus powered not by the mere *presence* of thinking content but by the processing *interactions* with it. In more diagrammatic words, the arrows and brackets in Figures 4 and 9 are as important in reflection as the boxes.

The TA-CF relationship has already been discussed in the article and in the supplementary discussion. Suffice to reiterate that it is presumably the most central interaction in the reflective process. Starting with the TA, reflection asks for one to render explicit and conscious its CF and further to examine the relevance and adequacy of their relation. More developed reflection would also include an ACEI examination of the core TA-CF relation; addition of the VC and S components in the process would develop it even more.

The relationship between TA and S is another example worth discussing. On one level, it entails examining what our TA tells us about our self. Reciprocally, it questions how our view of self can

explain our TA. On a different level, the TA-S interaction might also mean investigating the adequacy of our TA in fulfilling the view, goals, or objectives of the self. Thus, it can serve to contemplate if “what you think, what you say, and what you do are in harmony” which is a vision of happiness that some have attributed to Gandhi.⁷⁸

A theoretical and practical reason for considering the interactions of the five core components, is to allow for better reconciliation with certain features of reflection that appear missing in our conceptualization. For example, Wald has reported that the “awareness of self” was a critical, but absent, element in our model.⁷⁹ Yet, the idea of awareness of self is very much present: by combining the attentive subcomponent of ACEI with the S component, one becomes attentive—that is aware—to oneself. By avoiding too precise wording and by leaving the possibility of combining the core components, our goal was to create the most nimble and adaptable definition and model. Because our thematic analysis split the concept of awareness of self (present in Atkins and Murphy’s¹³ definition included in our analysis) into ACEI + S, it allows for an understanding reflection that is indeed aware of self, but also critical of self, exploratory of self, and in an iterative fashion. And through interactions with the other components, this awareness of self can be augmented with the inclusion of a view on change and of the underlying conceptual frame.

Reflection as the development of the core components and their connectedness

Many more relations between core components can be described. But for reasons of concision, we prefer above all to reinforce that the improvement of the reflective process is pursued by both developing the core components *and* their connectedness, not one in isolation from the other. Fully developed reflection entails the presence of (i) all five components, (ii) their growth, and (iii) the growth of their connections. It is in the interactivity of components that lies the multiplicative effect of reflection as exemplified in Table III.

Because of the great number of interrelations between its components, as Figure 4 shows, reflection cannot be adequately conceptualized as linear or sequence-based process. Reflection does not need to follow a specific series of steps to unfold; contrariwise, individual occurrences of reflection can be—and probably are—as unique as the individuals in which they take place. The core components and the relations between them must be developed, but clearly not in a predetermined process or ritualized method.

Extrinsic elements

We have reported that the extrinsic elements are those that characterize the reflective thinking process without making them inherently reflective. The article presented the trigger, the context, and an overview of other extrinsic elements. In this added section, we further elaborate on the triggers and the emotional element of reflection.

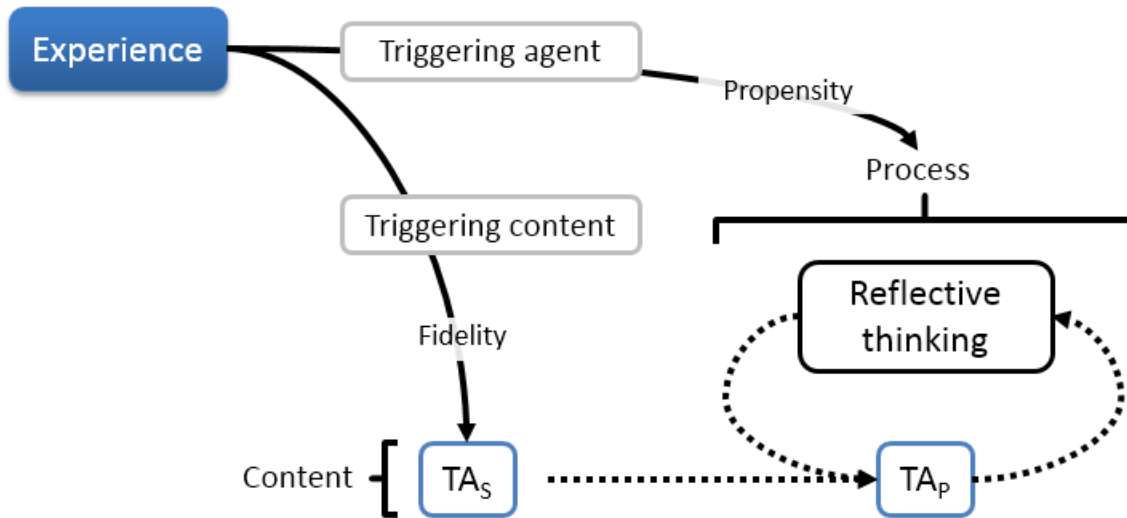
The triggers of reflection: triggering content and triggering agent

Most theorists speak of a trigger of reflection; Moon indicates that the “mental processing” of reflection emerges from “relatively complex or unstructured ideas,”³³ whereas Boyd and Fales say that it is “triggered by an experience.”⁷¹ For the majority of authors, the trigger is understood as the *content* (the starting/substrate TA component, or TA_S) that initiates the reflective process. It is usually content that is uncertain, hazy, or murky at the outset and needs clarification, what Atkins and Murphy refer to as “uncomfortable feelings and thoughts.”¹³ The article has already noted the distinction to be made between the content that triggers (i.e., the *triggering content*) reflection and the content that is fed into the reflective process. But as reflection is both characterized by its content as well as its process, another distinction to be made is the one between the *triggering content* and the *triggering agent* of reflection. Content cannot in itself trigger the *process* of reflection; there needs to be an agent to set it into motion. Frequently the triggering agent of reflection will be the one reflecting. Nonetheless, it can be an outside authority, as when learners are asked by their educators to be or become reflective. There is presumably an association between the extent of uncertainty and discomfort of the triggering content and its tendency for reflection to be self-triggered: a specific situation that is especially surprising will more readily compel one to start reflecting on one’s own. The same could be envisioned for an anxious individual who would more easily and frequently set off reflective processes than one who is complacent.

That there exists both a triggering agent and a triggering content in reflection, and that the same content and agent might—or *might not*—trigger reflection, opens up the notion of *propensity* for reflection. A high propensity to reflect is conceptualized as a high tendency for self-triggering of reflection and for reflection to be prompted by less surprising, uncertain, or murky content. Figure 10 shows how the construct of propensity in reflection fit in relation to the content and process of reflection. Another construct unveiled by the description of the triggering content of reflection is the *fidelity* of reflection. It is discussed in the later section *Practical considerations: implications*

for assessing and teaching reflection, along with potential implications for the propensity for reflection construct.

Figure 10. Triggering agent and triggering content in relation to reflective thinking



The emotional element of reflection

We have brushed on the emotional element of reflection in the article. We noted its likely presence in the TA component as content of reflection, and its classification with the extrinsic elements of reflection. Excluding the emotional dimension of reflection from its constitutional ones (i.e., the five core components) is debatable. For Boud et al. and others,^{13, 79} emotions have a crucial function in reflection: by “attending to feelings,” positive ones can remove obstructing one in order to better appraise the content of reflection.²⁸ Emotions can act as both a barrier and a facilitator for reflection. It is clear that emotions do influence reflection.

We ultimately decided to classify the emotional dimension as an extrinsic element of reflection because although often present and often influencing reflection it is not mandatory for it. Full reflection at its essence *can* occur without recourse to feelings and emotions. This is not to say that full reflection *should* occur without recourse to emotions, above all in circumstances where it does impact the content and the process of reflection. But it does amount to saying that there are many circumstances where, even without recourse to emotions, one’s reflection can still be wholly complete and deeply developed.

Implications for the knowledge and application of reflection

After discussions concerning the methodological considerations and exploration of our proposed model, we attend to its implications for the knowledge and application of reflection. We address theoretical considerations, first by comparing of our model of reflection with that of others. We then contrast of our construct of reflection with other cognitive theoretical and practical constructs (e.g., metacognition and script concordance). We conclude this section by addressing practical considerations related to the application and operationalization of reflection.

Theoretical considerations: the knowledge of reflection

Our model compared to other models of reflection

The argument for our model's theoretical capacity to unify the most influential conceptualizations of reflection and propose one that is both encompassing and current has already been reported in Table II. Supplementing its ability to integrate the previous models, our model can also be used to better identify areas of discrepancies between them. For example, not all theorists definitively refer to the presence of the CF component (i.e., Boud et al.,²⁸ Mann et al.,¹¹ Korthagen⁵⁸). Likewise, the S component appears to be absent in Dewey's, Schön's, or Hatton and Smith's definitions. The ability to assess how each *theorization* differs is particularly useful to diagnose why and how specific *applications* stemming from them differ in turn. This might explain a great deal of the difficulty of providing empirical proof of its practical effectiveness as reflection has been theorized and applied—perhaps unknowingly—in divergent ways.

Implications of our model of reflection with regards to other akin theoretical constructs

Because of the complex nature of reflection, there is confusion surrounding (i) the multiple conceptualizations of reflection and (ii) the construct of reflection with regards to other akin theoretical constructs (e.g., critical thinking,⁸⁰ dual-process theory,⁸¹ metacognition,⁸² and mindfulness^{83,84}). In addition to aiding in untangling the multiple views *of reflection*, our proposed model can also be used to contrast how reflection resembles and differs from these closely related constructs. The goal of the following comparison is not necessarily to be exhaustive nor to provide a complete analysis. Rather, we aim to explore the distinctness of reflection by discussing similarities and differences in order to clarify the nature of reflection itself.

Critical thinking (CT)

The development of the construct of reflection is partly tributary to that of critical thinking. Sharing common original theorists with reflection, such as Dewey and Habermas, critical thinking is described by Facione et al. to be:

“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. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon.”⁸⁰

Contrasting this definition with the one we propose for reflection shows an undeniable relationship bearing more commonalities than differences. As for reflection, CT is a form of expanded thinking, and both differ from generic good thinking. The further characteristics of CT that distinguish it from good thinking are quite similar to the core components of reflection: all five can be accounted for in some form.

Nonetheless CT and reflection are not synonymous. As the definition shows, CT pertains in particular to thinking focused on *judgment*—the cognitive processing *per se*; conversely, reflection is first concerned with thinking focused on TA (and eventually on one's CF behind them, a VC, and the relevance of the self). Reflective thinking does entail judging and thinking critically (in an ACEI way, with CF), but the critical thinking in reflection is more a means than an end. Whereas CT concentrates mostly on the process of thinking, reflection concentrates on its process *and* content. There is also another slight difference in emphasis the role of the self component. CT considers the self as essentially the *agent* of analytical thinking having the agency to enhance one's thinking; in reflection, the self must be considered both the *agent* and *content* (in Schön's words the dual “agent/experient”)²⁶ of thinking. Still, notwithstanding minor hair-splitting divergences, CT and reflection are very much alike. The literature on one could probably much inform and complement the other.

Dual-process theory

In delineating reflection, Dewey aimed to better characterize diverse forms of thinking, reflective thinking being one of them. A well accepted and more recent characterization of cognitive processes is the dual-process theory which partitions them into intuitive (system 1) and reflective (system 2) processes.⁸¹ System 1 proposes intuitive judgments while system 2 is the more analytical and reasoned processes that monitor to “endorse, correct, or override” the judgments of system 1 towards the final cognitive judgment.⁸⁵ The most interesting commonality between dual-process theory and reflection is the recognition of a tacit dimension in thinking. There is a correspondence between the effortless, opaque, automatic, and rapid processes of system 1 and the usual TA component; between the effortful, controlled, and self-aware processes of system 2 and the ACEI/CF components of reflection. But because dual-process theory—unlike reflection which attends to thoughts, actions and their transformation—is purely anchored in cognition, the VC and S components are lacking in presence and in relevance. The purpose of reflection being more far-ranging and encompassing than that of dual-process theory, reflection explicitly calls for a cognitive process directed at change, as well as a much greater role for the self in this process.

Metacognition

Reflection and metacognition are related constructs,⁸⁶ and some authors have described reflection as a “metacognitive process”.¹⁰ Metacognition is commonly defined as “cognition about cognition” or “knowledge about knowledge.”⁸² As was the case with critical thinking and dual-process theory, metacognition resembles reflection being a specific form of thinking. More specifically, reflection does relate to a form of metacognition since it is indeed concerned with thinking about TA, CF, VC, and S. But our model of reflection also shows how reflection is different from general metacognition.

Firstly, one cannot simply think about thinking in any fashion in reflection. Reflective thinking must involve all five TA, ACEI, CF, VC and S components which are not necessarily present in all metacognition, some forms of which can omit critical thinking, conceptual frames, or a view on change for example. Thus, reflection is not only a more precise form of *thinking*, it is also a more precise form of *thinking about thinking*, i.e., of metacognition.⁸⁷

Moreover, there is a fine but important nuance in the *nature* of the thinking about thinking that metacognition requires. According to Flavell, metacognitive experiences are “any conscious cognitive or affective experiences that accompany and pertain to any intellectual enterprise.”⁸²

Two distinctions must be made with reflection: first is that even if fully developed reflective thinking implies consciousness of this thinking, forms of reflection *can* occur without full conscious grasp of the “intellectual enterprise” at hand. One can reflect by thinking about TA, CF, VC, about self, in an ACEI without mandatorily attending to its conscious unfolding, although one’s reflection will certainly be enhanced by being fully metacognitive. The second distinction is that metacognition is cognition about the *process* of thinking (i.e., the “intellectual enterprise”) whereas reflection is cognition that can involve both of the *process* and the *content* of thinking. Metacognitive knowledge “consists primarily of knowledge or beliefs about what factors or variables act and interact in what ways to affect the course and outcome of cognitive enterprises.”⁸² To draw a parallel with the core components of reflection, metacognition entails thinking most particularly about the ACEI thinking component—its process-related component—, when reflection is also thinking about all other four components—its content and process-related components.

Mindfulness and mindful practice

As is reported in the article, many authors relate reflection to mindfulness.^{83, 88} Mindfulness and the mindful practitioner are described by Epstein as:

“a discipline and an attitude of mind. It requires critical informed curiosity and courage to see the world as it is rather than how one would have it be. Mindful practitioners tolerate making conscious their previously unconscious actions and errors.”⁸³

There are obviously many historical, epistemological, and teleological differences between reflection and mindfulness. Not delving into all of them, we wish to discuss two major points. Firstly, at its essence, mindfulness calls for greater consciousness and attending to experience. It is thus connected to and complements the attentive subcomponent of the ACEI component. “When one is mindful, one lives in the present and pays attention.”⁸⁸ It is also linked with the triggering of reflection: as the mindful practitioner “is present in everyday experience, in all of its manifestations, including actions, thoughts, sensations, images, and interpretations, and emotions,” and makes “conscious their previously unconscious actions and errors,”⁸³ reflection is more readily triggered.

Secondly, a major difference between mindfulness and reflection is the non-conceptual essence of mindfulness which has its roots in Zen Buddhism.^{88,89} By leading “the mind back from theories, attitudes and abstractions [...] to the situation of experience itself,”⁹⁰ it is to be distinguished from reflection which eventually requires thinking encompassing theories, abstractions, and a view on transforming them as the CF and VC component embody. Although, mindfulness and mindful practice appear to be powerful adjuncts to the process of reflecting, especially to the ACEI component, they are not equivalent to it.

Implications of our model of reflection with regards to two practical concepts

To add to implications of our model with professional development and autonomy that were discussed in the article, we briefly touch on potential relations between reflection and two others practical concepts in medical education: problem-based learning⁹¹ and the script concordance approach.⁹²

Problem-based learning (PBL)

Although iterations of problem-based learning differs in various schools, four processes underlie PBL according to Dolmans et al.,⁹³ i.e., constructive, self-directed, collaborative, and contextual processes. Albanese reports that the McMaster Philosophy, where PBL was created, has “self-directed learning, PBL, and small group tutorial learning” as its three key features.⁹⁴ Using our model of reflection as a comparison point, we can hypothesize that PBL might be more conducive to reflection than other learning methods, such as the more classical lecture-based learning. There are many commonalities between the core components of reflection and the processes and key features of PBL. The constructive and contextual processes of PBL echo the CF component, while the self-direction is evidently linked with the S component. The collaborative small group learning encourages the mobilization and ACEI analysis of one’s TA and CF. Furthermore, when resolving a PBL scenario the constructive process fosters a collaborative and ACEI thinking that is aimed at change (VC).

Script concordance approach (SCA)

Just as PBL can be theorized as a more reflective learning method, the script concordance approach might be considered a more reflective assessment modality. The SCA is “designed to probe whether the organization of clinical knowledge [...] allows adequate clinical decisions.”⁹² By intending “to assess the meaningfulness of the links among items, rather than assessing items in isolation,” the SCA explicitly examines the CF component in decision-making. This contrasts with

multiple-choice or key-feature questions which only evaluate the end-decision itself (akin to the TA component). Also, by providing answers of the panel of experts which can be discrepant from those of the examinees, the SCA fosters a more ACEI analysis of the examinees' TA and CF components; not only is the erroneous decision analyzed, but also the cognitive content that led to it. Finally, because SCA usually features authentic—thus uncertain and equivocal—clinical cases that call for interpretation of data in making decisions, these might further enhance the triggering and fostering of reflection than more straightforward cases.

Practical considerations: implications for assessing and teaching reflection

To supplement the *Assessment and teaching* section of the article, we now further discuss implications of our model on the application of reflection when evaluating and fostering it.

The primary goal of our thematic analysis and synthesis was to provide a model of reflection better suited for its operationalization. We proposed that reflection could be more adequately translated into assessment and teaching by being conceptualized in a structure-driven and not outcome-driven model, and in a discriminative way.

Benefits of structure-driven reflection

Our model comprises five core components and their interrelations that together constitute what reflection is. This renders completely explicit what is required for reflection to fully develop. One's reflection can thereby be examined for the presence or absence of each component. The components that are present can in turn be examined individually to expand them further. By allowing for identification and remediation of inadequately developed or missing component (or components) in reflection, our structure-driven model is more informative and easily operationalized than other conceptualizations that do not provide such a structure.

In addition to the core components themselves, their aforementioned connectedness also has repercussions in the operationalization of reflection. When assessing or teaching reflection, it must be stressed that the depth and quality of reflection will also be determined by the interrelations between components. The most significant interrelation being between TA and CF, it must be thoroughly scrutinized and developed in reflection. Does my understanding accurately explain my thoughts and actions? Likewise, whereas ACEI thinking about TA will be more common than about CF, reflection must entail close inspection of CF along with the other components. One will perhaps examine the self and its relation with one's TA, but in reflecting one should also aim

to change (VC) not only one's TA but also oneself. These interactions are fundamental to reflection. Although far from easy, they must be analyzed and fostered.

Benefits of reflection that is not outcome-driven

Reflection is a process, not an outcome. A point should however be made: our model—as any—does call for an outcome, but this outcome is a *process* (that of thinking in an ACEI, about TA, CF, and S, with a view at change) not a *content*. Defining by outcome becomes problematic is when this outcome is content-based. Reflection is at its essence a thinking process and setting its outcome as a specific content nullifies the possibility of further thinking once this specific content has been thought about, because *content* is perforce state-like and fixed. Contrariwise, even if its outcome is defined as a specific process—with a specific structure—, reflection and the thinking it involves can be pursued indefinitely, because *process* entails motion, action, and the idea of a progress and course in time. Our model delineates how the process of reflective thinking is distinct from other processes, without any defining an outcome-content.

It is capital that both the understanding and the operationalization of reflection take into account this distinction between the outcome-content of reflection and its process (or outcome-process). In assessing and teaching reflection, the former cannot be substituted for the latter; at most it might be a proxy. It would be senseless to state higher levels of *reflection* for experts compared to novices on the sole basis of greater *content-expertise*, as this greater expertise was probably antecedent to reflection. But this is what happens when assessment of content is substituted for assessment of process. Besides, when facing expert material, the novice will hardly be able to be reflective; conversely, the same can be said for the expert faced with novice material. In other words, one cannot judge nor foster reflection solely using the TA/content component. Teaching and assessing reflection cannot be teaching and assessing a *set content*. Rather, it is rather the *difference*, the amount of processing and change between the starting content (TA_{starting}) and the outcome-content (TA_{processed}) of reflection that is its better *proxy* measure. Highly mature reflection that involves all five components in deep interaction will evidently foster more extensive advancement between the starting content and the outcome-content. Another metaphor to help distinguish the between the assessment of the outcome and the process of reflection is that of the odometer and the tachymeter. The odometer measures the distanced *travelled*, i.e., the *content that has been acquired*; an expert might have travelled a lot, a novice much less. But the tachymeter measures the speed, the distance *being travelled*, i.e., the *process*

that supports the acquisition of content; a novice might well drive much faster than an expert, despite still being far from him in total mileage. Starting with the same level of content and expertise and, *ceteris paribus*, greater reflection will travel farther and translate into greater expertise.

Trigger and frequency of reflection

Because our proposed model is discriminative of what reflection requires, it facilitates the reliable identification of occurrences of reflection and of what triggers them. The current assessment and teaching of reflection is principally interested in reflection-on-action (i.e., reflection after the action), and more exactly with what could be labelled “reflection-on-demand” (i.e., reflection after the action *and* when asked for reflection), for example, in reflective writing.⁹⁵ There are presumably many significant differences between reflection-on-demand and authentic *in vivo* reflection in- and on-action. Yet, what is important in reflection is not only to better reflect-on-demand, but also to better reflect *tout court*. Consequently, the future teaching and assessment of reflection should include provision for its triggers and frequency of occurrence. Because a propensity to trigger and undergo reflection frequently might reasonably be more indicative of the impacts of reflection on practice than is the ability to reflect on demand, the factors that influence both triggering and occurrence of reflection should be further studied.

Fidelity

Because our model of reflection distinguishes between the five core components and other elements external to reflection, it allows for the analysis of what can be labelled the *fidelity of reflection*. By clearly identifying what is involved in reflection, it becomes possible to examine if its content adequately mirrors the experience reflection stems from. As the TA component of reflection emerges from the reality of experience, the process of its inclusion into reflection can be error and bias prone. The ACEI component calls for close appreciation of our TA; in doing so, one should examine whether the starting TA content is a faithful representation of the true triggering event that led to reflection, and scrutinize it for inadequacies that might mar reflection from the outset. Figure 10 shows how the concept of fidelity of reflection fits in its broader context, between the triggering content and TAs.

Further avenues of research

As was mentioned previously in the *Methodological considerations* section, the ultimate test of validity and usefulness of our model of reflection is its ability to inform practice. The fundamental

goal of the construct of reflection is to foster better thinking and actions, and in medicine better practitioners and clinicians. To study if our model can eventually assist in this endeavor, we here present a few further avenues of research for its theoretical validation and its concrete application.

Testing our conceptualization: an assessment instrument for reflection

One logical next step after producing a model for a construct is to use it as a blueprint to devise an assessment instrument. Once reflection can be reliably measured, it will be possible to characterize its correlation with other constructs in medical education (e.g., expertise, professionalism, clinical reasoning, etc.). This correlation would provide empirical arguments for the validity of reflection and our conceptualization of it.

There are many options in the medical education literature for creating an assessment instrument: (i) scales, (ii) thematic coding, (iii) qualitative analysis, and (iv) analytical instructional rubrics.⁹⁶ Each has its benefits and disadvantages; the most significant disadvantage of the last three options is that they can only assess reflective writing or productions, which probably differs from reflection *in vivo* as has been discussed. Therefore, devising a new scale using our conceptualization of reflection might be the most attractive further avenue of research. Using our five-component view of reflection, a multidimensional questionnaire could be constructed with subscales for each component and for the interactions between them.

Using our conceptualization to foster reflection

Instead of measuring reflection, one avenue of research could proceed directly to the application of our conceptualization to foster it. Without necessarily testing our model, one could still develop reflective applications based on it (e.g., reflective questioning, reflective mentoring, or reflective writing). Because our model is structure-driven and discriminative, we hypothesize that it will greatly improve the transfer of the complex theoretical concept of reflection into practice. For example, in reflective writing, broad instructions about the five core components that reflection entails could be provided to learners beforehand; in reflective questioning and mentoring, training could be arranged for educators with regards to how best to trigger and cultivate reflection.

Our theoretical model of reflection can also be used to examine how the extrinsic elements (e.g., timing, environment, discipline, or emotions) might influence reflection, each of its core

components, and their fostering. Obviously, examining the influence of extrinsic elements on reflection will be facilitated if reflection itself can be assessed independently and reliably (which brings us to the usefulness of an assessment scale for reflection). There is thus a delicate balance to be struck between the uninformed *practical usage* of a theoretical model and an interest in the sole *validation* of a model, especially when its true usefulness lies in practice. The abstract and the concrete are indissociable, as Dewey noted, and the further study of reflection must explore both sides.

Methodological research

We wish to mention one last idea for further research which pertains not to reflection but to the methodology of our research process. In pedagogy, reflection is not alone among concepts in need of clarification with regards to their definition and operationalization. We hypothesize that the methodology we used to clarify and better define reflection might serve as a guiding process for clarification of other unsettled concepts in education.

Conclusion

In philosophy and education, reflection has long been a fundamental concept. From its early description by the Greek philosophers to the more recent inquiry by educational theorists, most notably Dewey and Schön, reflection has remained a hazy, murky, and complex concept. With its massive uptake and development by educators and professionals in practice, its enigmatic nature has culminated in major difficulties in operationalization and empiric validity.

Aiming to clarify the nature of reflection, we conducted a research process involving a systematic appraisal of the current literature for the most influential definitions of reflection and coined a new unifying meta-definition and model. To provide the most pragmatic and useful conceptualization of reflection, our process was directed by five criteria: structure-driven modeling, systematic representativeness, discriminative ability, context/content-independence, and operationalization.

Reflection comprises five core components (TA, ACEI, CF, VC, S), distinct from its numerous extrinsic elements, and is defined as:

The process of engaging the self in attentive, critical, exploratory, and iterative interactions with one's thoughts and actions, and their underlying conceptual frame, with a view to changing them and with a view on the change itself.

We submit that our proposed definition and model provide a new platform to understand, study, assess, and teach reflection. In consideration of their multiple advantages—both practical and theoretical—over current definitions, we believe that they will open up new avenues of inquiry, along better delineated and consensual understanding of reflection. To better understand, to better study, and to better foster reflection are imperative if reflection is to fulfill its promise to enrich, enhance, and emancipate not only one's thinking, but also one's living.

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