

Developing higher order thinking in medical education through reflective learning and research

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I hear and I forget. I see and I remember. I do and I understand.
Confucius 551 - 479 BC

Abstract

Reflection in education is not a new concept for as Meiklejohn (1882) enthused, 'learning is a social act.' Dewey (1933), a key twentieth century instigator of the concept of reflection, expanded upon the ideas of earlier educators including Plato, Aristotle, Confucius, Lao Tzu, Solomon, and Buddha (Houston, 1988). The preferred reflective model of Perioperative Critical Care pathway students at the University of Bedfordshire has been Reflection-for-Learning. This student-centred model of reflection was developed for their use to meet student identified needs.

When defining reflection, Beckwith and Beckwith (2008) draw upon Larrivee (2006, p.2) who suggests that the goal of reflective practice is to create deeper understanding and insight, forming the basis for not only considering alternatives, but also for taking action to continually improve practice throughout one's career. She continues to explain that becoming a reflective practitioner means perpetually growing and expanding, opening up to a greater range of possible choices and responses to various situations and that building the habit of reflective practice allows practitioners to remain fluid in the dynamic environment. Resta (2007) offers that we should not teach but that the student should undertake guided research, supported by students' own reflections.

A review of the current models of reflection was undertaken; this resulted in the premise that the student and their learning were not the focus of the previously established reflective models. The higher order thinking skill of reflection is part of the process of higher order cognition, requiring the use of dialogue and language (King, Goodson & Rohani, 2008). So, when the students are making statements and counter statements requiring the challenging and defending of their assumptions, there is an intention for the development of higher order thinking McKendree *et al.* (1998). Beckwith and Beckwith (2008) describe the identification of the requirements for a model of reflection that could be accessed by the Operating Department Practitioner student and further articulate that the model should introduce these students to the concepts of reflection and allow the students to reflect upon their educational experience as opposed to their interaction with the client. Beckwith and Beckwith (2008) identified that no current model met these criteria; therefore it was decided to create a new model drawing from existing literature. These authors further explain that a cyclical model with its accepted limitation of the single entry point as Palmer, Burns and Bulman (1994) suggests, would in fact be beneficial for this student group with their novice experience with reflection.

Beckwith and Beckwith (2008) clarified how a previous review of the literature was undertaken which identified that models of reflection commonly favoured in nurse education were not fit for purpose. For example, Schon's (1983, 1987) *Reflection-in-action* describes reflection as finding a solution through framing and reframing whilst the professional thinks on his or her feet. He further suggests that this almost subconscious process creates a synergy of theory and practice which is a hallmark of an expert practitioner (Schön, 1983, Schön 1987). Beckwith and Beckwith (2008) highlight Schön's introduction of *Reflection-on-action* as a retrospective process whereby the student looks back at an incident and analyses what he or she can learn from it and through this process the student may decide to omit an action or conversely instigate a predetermined set of actions. Beckwith and Beckwith (2008) argue that this can be taken one stage further, with *Reflection-for-Learning*, whereby the resultant actions are being influenced by evidence based practice and structured through the use of a personal development plan (Schön 1983, Schön 1987). Here, an emphasis is placed on emotions and the suggestion that much can be gained from how the practitioner's feelings influenced the care given (Benner 1984., Palmer, Burns, and Bulman, 1994). However, as Beckwith and Beckwith (2008) illuminate, the introduction of

reflection to a mature student can be fraught with emotional entanglement; making them face powerful emotions can be counterproductive. When constructing the Reflection-for-Learning model, this author rejected the use of emotive wording. Beckwith and Beckwith (2008) outlined that the Reflection-for-Learning model contains five elements (Figure 1 and as outlined in detail in the next section of this paper) that reveal the many facets of the reflective learner. Beckwith and Beckwith (2008) concluded that as the student evolves as a reflective practitioner, these elements are not only useful as discreet tools, but will facilitate the students' overall move from a superficial to profound reflective learner (Hatton & Smith, 1995. Hess, 1999. Jay & Johnson, 2002. Larrivee, 2004).

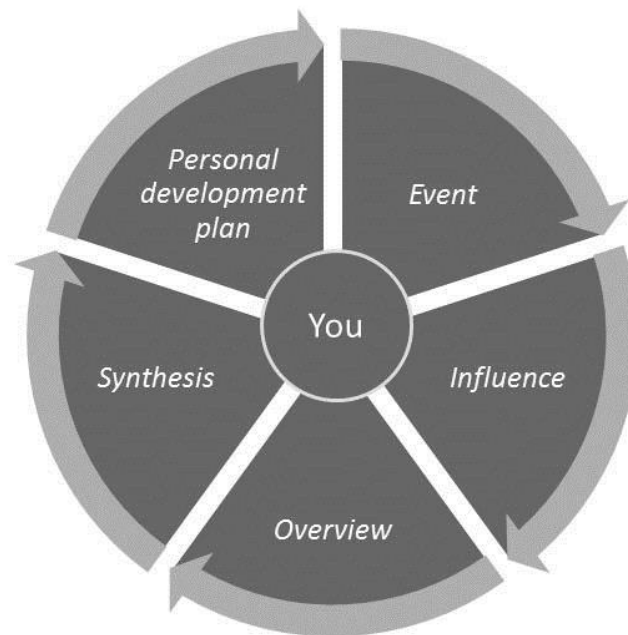


Figure 1 (Beckwith, 2005)

It has been established that the Reflection-for-Learning model meets many requirements for developing higher order thinking skills (HOTS) (Figure 2), developing good feedback practices, as well as helping the student develop as a lifelong learner (University of North Texas Health Science Center, 2010; Kumar & Venable, 2014; Beckwith & Beckwith, 2015; King, Goodson & Rohan, 2008). However, as with all living entities, the Reflection-for-Learning model is an evolving beast. At its inception Reflection-for-Learning drew upon Benjamin Bloom's Taxonomy of Cognitive Objectives (Bloom. *et al*, 1956). But in 2000, Lorin Anderson, a former student of Bloom's, suggested a move away from the use of nouns to verbs in this taxonomy (Anderson *et al*, 2000). Pohl (2000) agreed with this suggestion by blending both approaches. This has been demonstrated in Figure 3.

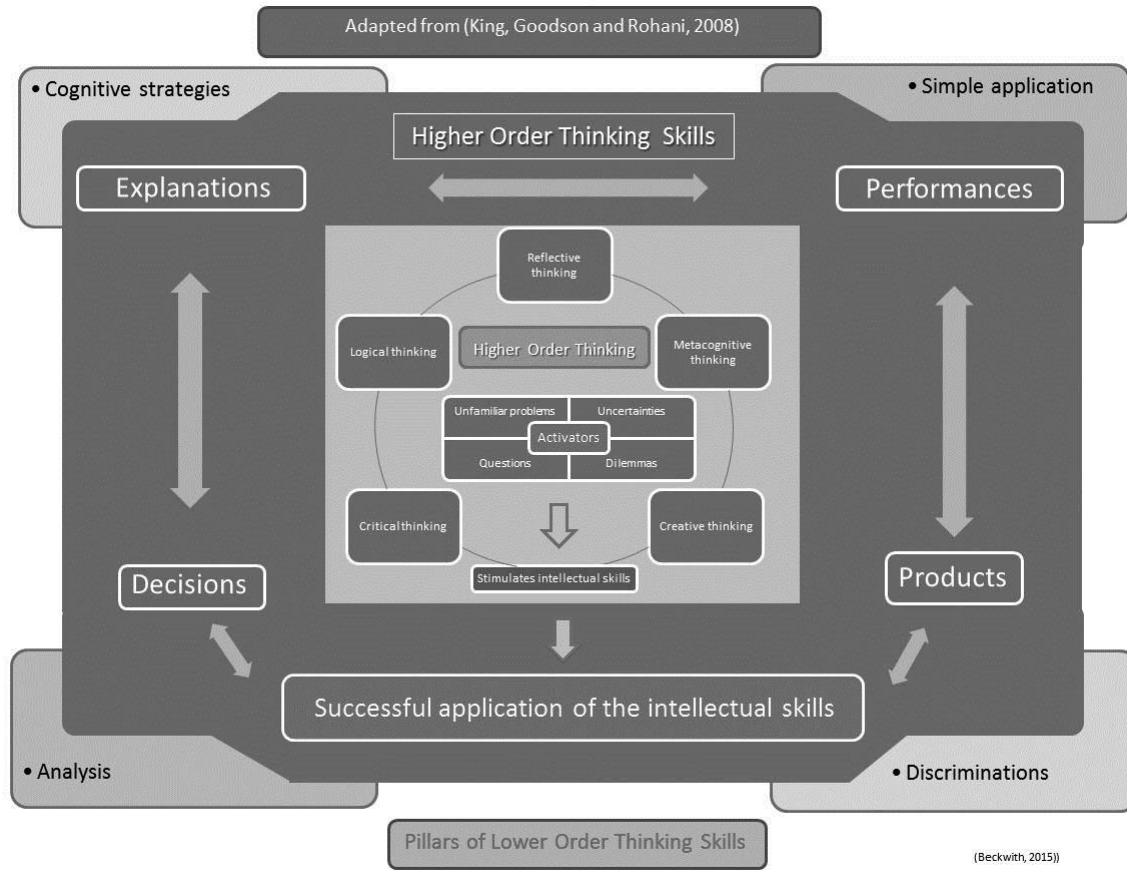


Figure 2

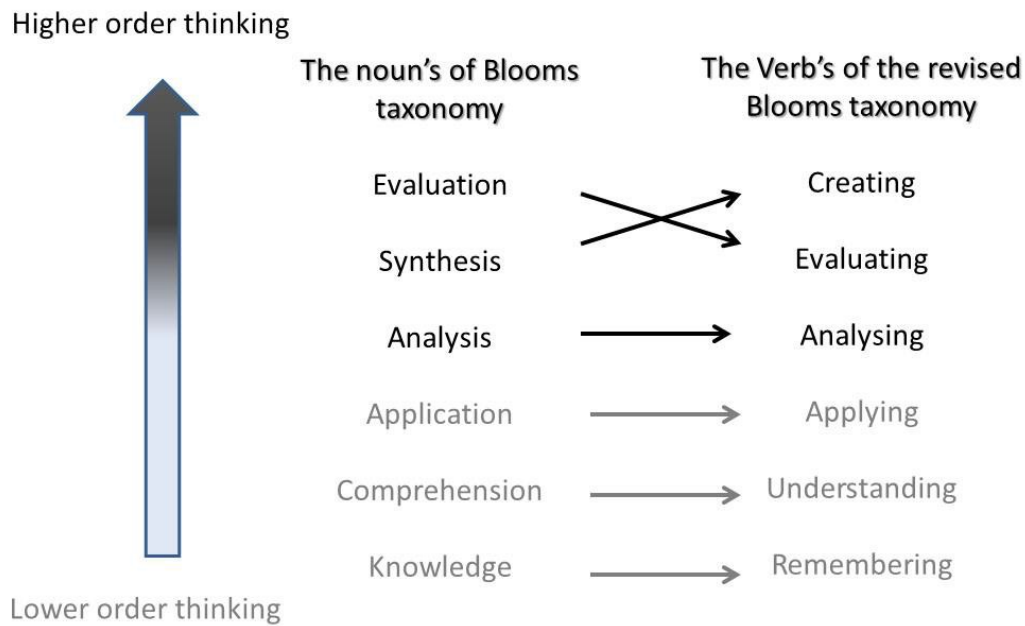


Figure 3

What is Reflection-for-learning and how is it used?

In the *event* section of the Reflection-for-Learning model (Beckwith & Beckwith, 2008) there is a requirement for the student to recognise and identify an area in which there may be a problem, lack of understanding, or gap in their knowledge. In Bloom's taxonomy (Bloom, B. *et al*, 1956) this is described with the nouns *knowledge* and *comprehension*; when converted to Anderson's verbs (Anderson, L. *et al*, 2000) they become *remembering* and *understanding*. Therefore, in the *event* portion of the Reflection-for-Learning model we are asking the student to remember what happened and attempt to understand the actions and processes that led to the event.

Moving on, the student encounters the *influence* section of this model, where the student is asked to identify the impact the recognised event has upon their development as a practitioner. At this point a student's emotions and self-perceptions may come to the forefront; however students are also encouraged to reach through and beyond initial reactions to look at the long range influence of the event. At this point in the reflective cycle the student is being asked to identify what has brought him or her to this point: What do they remember? What is it that I understand? What are my perceptions? How do I feel about this event? This in turn leads the student to develop a reflective question based upon their own developmental needs.

Having developed a reflective question, the student will now engage with the *overview* section of the Reflection-for-Learning model (Beckwith & Beckwith, 2008). The student undertakes an investigation or analysis and is asked to research aspects of the event which will in turn guide his or her learning in an evidence based manner and thus expand upon his or her own previous experiences and learning. Many students new to this model attempt to skip this part, often deciding that they've made an error and that they will simply avoid making such an error again. But this lack of analysis upon what has taken place merely lends the student to the trials and tribulations of making error after error until he or she has learned all of the mistakes one must avoid. This chaotic model of learning may be acceptable in some aspects of life, but certainly unacceptable in the field of healthcare, where errors can easily lead to patient harm (Beckwith & Beckwith, 2015).

In the *synthesis* section of the Reflection-for-Learning model (Beckwith & Beckwith, 2008) the student is asked to take the evidence discovered or reviewed and apply this to his or her identified event, demonstrating new evidence based thinking and perhaps a different approach that will affect future practice. At this point the student is, as Anderson's (Anderson *et al*, 2000) verb indicates, *evaluating*, which is now placed fifth in the hierarchy of the revised Bloom's taxonomy (Bloom *et al*, 1956). Whilst the student is undertaking *synthesis* or *creating*, both suggest new thinking has taken place. But students are, in fact, *evaluating* what constitutes the *event* within the context of his or her new thinking, thereby expanding upon and identifying what is considered to be best practice, with the expectation being that the student will take this new knowledge to the final stage of the reflective cycle.

Finally, the student engages with the *personal development plan* section of this reflective model. The student is required to formalise this *synthesis* by creating a plan to continue to employ this new learning and identify resources needed in order to re-encounter the identified *event* once again. In Bloom's taxonomy (Bloom *et al*, 1956) the noun *synthesis* is interchangeable with Anderson's verb *creating* (Anderson *et al*, 2000) which Anderson in turn elevates to the sixth position in the hierarchy of the revised Bloom's taxonomy aligning with the Reflection-for-Learning model (Beckwith & Beckwith, 2008). The *personal development plan* section is another part of the reflective process that some students fail to appreciate. The Higher Education Academy (2010) defines a personal development plan (PDP) as 'a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development'. This step is integral to helping the learner develop the self-direction needed to be a life-long learner. It is due to this aspect of the model that the Reflection-for-Learning model (Beckwith & Beckwith, 2008) is not cyclical, but helical (Figure 4) as the personal development plan is intended to propel the learner forward to new experiences, learning, and development (Beckwith & Beckwith, 2015).

Helical representation of reflection for learning

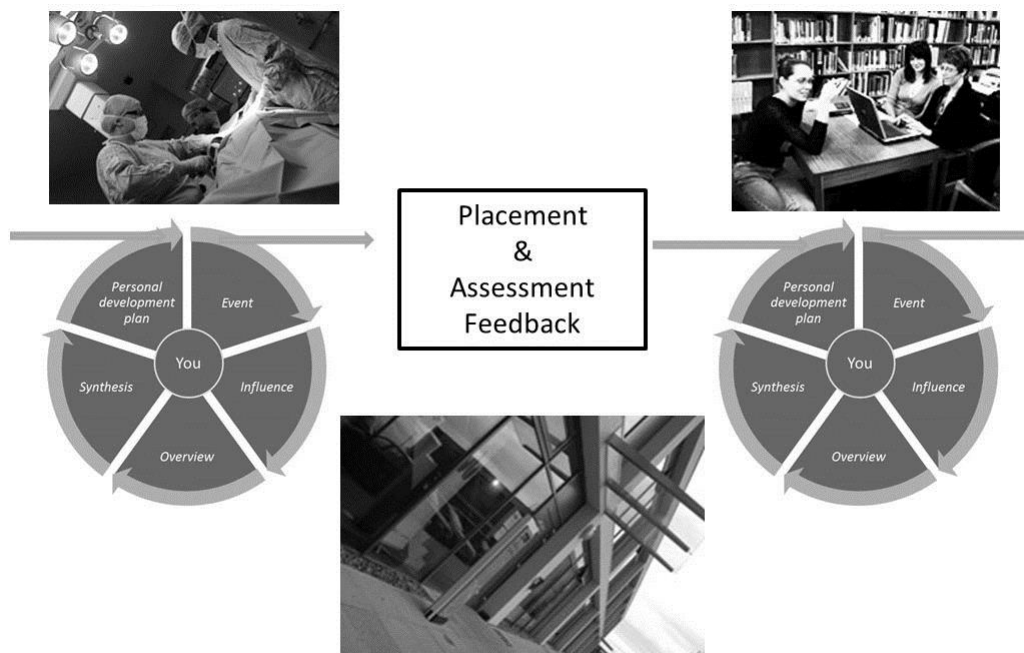


Figure 4

Reflection as a pedagogical strategy

As an educator, preparing students to enter a profession and the challenges this presents, one is mindful of what this entails. The challenges of practice involve knowledge and skills acquisition and the application of values. Professional pedagogies facilitate students in the formation of practical judgments. It is suggested that these pedagogies can bridge the theory/practice divide (McGuire *et al.* 2007). McGuire *et al.* (2007) expand upon this premise by suggesting that higher order thinking skills, such as analysing and evaluating, cannot be assimilated by exposure alone. Again they contest that practice experience in a complex world requires reflection as a critical skill for what they refer to as ‘functioning effectively in diverse and complex practice realities’ (McGuire *et al.* 2007. p.93).

Demonstrating higher order thinking through the use of analyses and evaluation in the form of a structured reflective model can be described as a lifelong learning skill. ‘Reflective writing ... focuses on the writer’s learning experience itself and attempts to identify the significance and meaning of a given learning experience, primarily for the writer’ (Fink, 2003, p. 117). This process of identifying the significance and meaning of a given learning experience, and closing the theory practice divide can be seen in Figure 4.

McGuire *et al.* (2007) warn that the ‘term paper’ has all too often been the standard way of demonstrating the students’ achievement of learning outcomes, without developing insightfulness of their capacity or their ability to integrate theory to practice. ‘Reflective writing has the potential to facilitate both self-reflection and integration of theory and practice. It also shows promise in assisting students in identifying the connection between personal experiences and professional values’ (McGuire *et al.* 2007, p.94). Free thinking without purpose or structure, or the identification of mere facts and feelings, does not demonstrate reflection, as it must also challenge assumptions and test conclusions (McGuire *et al.*, 2007).

Using the Reflection-for-Learning model for many types of learning

The Reflection-for-Learning model (Beckwith & Beckwith, 2008) is a versatile tool and was used in the construction of the intervention described by Beckwith and Beckwith (2015) as follows: *the event*, was the identification of poor NSS scores regarding feedback and the recognition that many students failed to recognise feedback, looked only at their grade, and/or continued to make the same errors assessment after assessment. The *influence* was the poor student engagement with the feedback

negatively impacted on student learning and frustrated the educators, for whom marking and creating worthwhile feedback was requiring substantial time and hard work. The *overview* was the exploration of current evidence relating to professional standards, employability, feedback, and fostering student-centred, self-directed, reflective learning for the development of higher-order thinking. The *synthesis* involved using Reflection-for-learning (Beckwith & Beckwith, 2008) to help the student see the value of their feedback and learn how to use feedback to move forward in their educational goals. The *personal development plan* included a continuous review of the student suggestions to gain insight in how the student interprets the information provided and for improvements for future changes taking the potential to improve student/teacher collaboration forward in efforts to strengthen the quality of learning. [Reproduced with kind permission from Beckwith & Beckwith, 2008; Beckwith & Beckwith, 2015.]

But does Reflection-for-Learning develop higher order thinking?

In the above scenario, in the *event*, it was identified that many students looked only at their grades and failed to recognise their feedback. This reinforces the assertion by King, Goodson and Rohani (2008) that higher order thinking skills are activated when they happen upon uncertainties and/or unfamiliar problems. The *influence* was the poor student engagement with what King, Goodson and Rohani (2008) described as lower order thinking skills, such as application, analysis, and cognitive strategies. These are the supporting skills which underpin the higher order thinking skills (Figure 2).

Additionally, in the above scenario, the *overview* was the consideration of current evidence pertaining to student-centred and self-directed learning (Beckwith & Beckwith, 2015). King, Goodson and Rohani (2008) support this in that better decisions may only be made in the context of the knowledge available. The *synthesis* (Beckwith & Beckwith, 2008) in the above scenario involved promoting the value of the lecturers' feedback and development of its use to create a student able to reflect. This reflective learning in turn develops higher-order thinking, which informs the personal development plan' (Beckwith & Beckwith, 2015).

Furthermore, the *personal development plan* (Figure 4) requires that the student interprets the feedback. This interpretation and interaction between the student and the teacher fosters enhanced student/teacher collaboration. The collaboration stimulates debate and creates new thinking, developing higher-order thinking, and thus potentiating the skills required for lifelong learning.

Success is neither magical nor mysterious. Success is the natural consequence of consistently applying basic fundamentals.

Jim Rohn (1930-2009)

From student to researcher and lifelong learner

Having established Reflection-for-Learning as a set of basic fundamentals, where the student travels down their academic path progressing from one that uses research to one who undertakes it, can Reflection-for-Learning transition into Reflection-for-Research? Consistency in pedagogy is a gold standard as can be seen with the use of scaffolding (Pinantoan, 2013). Scaffolding in higher education has its framework in what Pinantoan (2013) describes as the instructor being an 'activator'. He further states that the instructor will facilitate the student's mastery of a concept. At this point we can substitute instructor for the Reflection-for-Learning model, with the model facilitating the mastery of the concept of reflection. Pinantoan (2013) then introduces 'fading', defining this process as 'gradually removing the scaffolding that was put into place for the student until he internalizes the information and becomes a self-regulated, independent learner' (Pinantoan, 2013). The removing of the scaffold described by Pinantoan (2013) could just as well be describing the transition from student to researcher and their move from Reflection-for-Learning to Reflection-for-Research. This move, with Pinantoan's (2013) 'activator' and 'fading' processes, creates a *zone of proximal development* (Vygotsky, 1978). This zone of proximal development is defined as 'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under guidance ...' (Vygotsky, 1978, p. 86). Vygotsky's (1978) narrative mirrors the Reflection-for-Learning cycle with its problem solving under guidance, and the Reflection-for-Research continuum represents independent problem solving.

Reflection-for-learning is a cyclical process that with the expansion of the process over time becomes a helical process. It can be argued that research is a 'continuum' with a start point, 'the research question', and an end point, 'the research paper'. Transitioning Reflection-for-Learning to Reflection-for-Research, offers the following (Figure 5):

Traditionally in the *event* section of the Reflection-for-Learning model there is a requirement for the student to recognise and identify an area in which there may be a problem, lack of understanding, or gap in their knowledge. In Bloom's taxonomy (Bloom, B. *et al*, 1956) this is described with the nouns *knowledge and comprehension*, and in this instance, the nouns are more appropriate than Anderson's verbs *remembering* and *understanding* (Anderson, L. *et al*, 2000). Therefore the *event* becomes the *research question* and thus the first stage in the continuum whereby the researcher identifies *That which causes concern or may be improved upon, which is not addressed in scholarly literature, while requiring meaningful understanding through deliberate investigation*.

The student would then progress through the cycle to the *influence* section of this model, where the student is asked to identify the impact the recognised *event* has upon their development as a practitioner. In Reflection-for-Research *influence* becomes the *literature review*, in undertaking a *literature review* the researcher will review the current literature by which the deficit within the scholarly literature will be identified, therefore informing the investigation that is to take place.

Having developed a reflective research question the student will now engage with the *study structure* section of the Reflection-for-Research model, replacing the traditional overview section of Reflection-for-Learning. This section requires that the researcher undertakes an investigation or analysis and is asked to research aspects of the research question, this will in turn inform his or her studies approach to ethics, methodology, method and data collection used within their investigation.

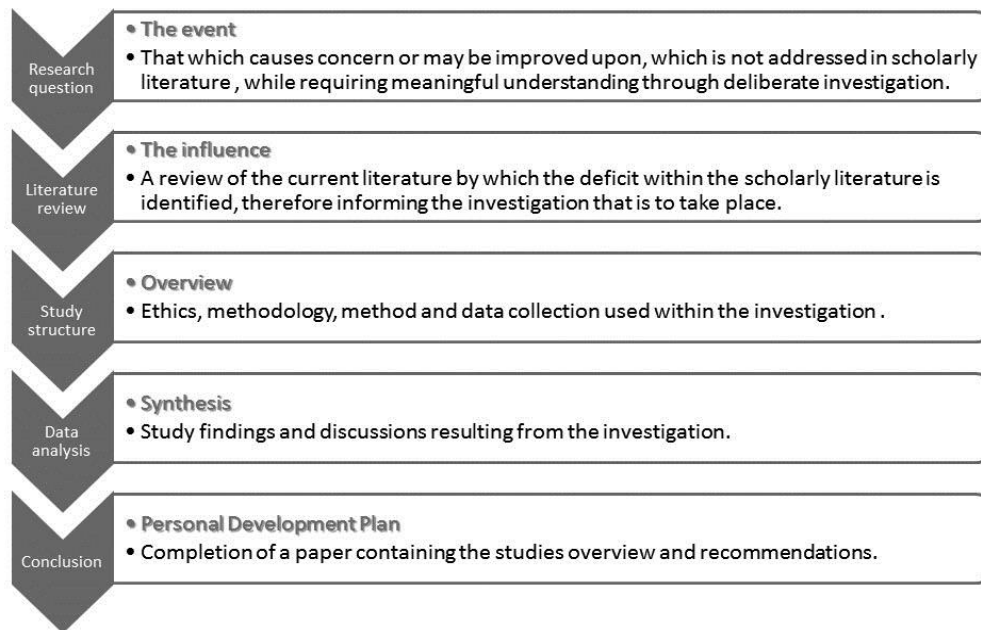
The *synthesis* section of the Reflection-for-Learning model requires that the student takes the evidence discovered or reviewed and applying this to his or her identified event. At this point the student is as Anderson's verb indicates *evaluating* Anderson, L. *et al* (2000). However, in Reflection-for-Research *synthesis* becomes *data analysis* with the process of moving from Bloom's noun *synthesis* (Bloom *et al*, 1956) to Anderson's (Anderson *et al*, 2000) verb *creating*. This implies new thinking pertaining to the research question, with the expectation being that the researcher will take this new knowledge to the final stage of the research continuum.

Lastly, in the Reflection-for-Learning cycle the student would then develop their *personal development plan* in anticipation of reengaging with the *event*. This is where Reflection-for-Research differs greatly. This stage of the continuum is the *conclusion* in which the researcher completes a paper containing the studies overview and recommendations.

Reflection-for-Learning is a reflective model, designed to guide a student from being novice to competent reflective practitioner. Reflection-for-Research is part of the lifelong learning skill set developing a student into a researcher, by taking that which is familiar to a new level. Figure 5 gives a graphical overview of the Reflection-for-Research Continuum, representing how it can be used for structuring the researcher's study and then informing their chapters.

The Reflection-for-Research Continuum

The research concept



Adding to the body of knowledge

Figure 5

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