Reflection and its Application to Learning Resources

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Abstract

Reflection is a process of engaging intellectually and affectively in situations, activities, or resources to develop deep understandings and appreciations of one's experiences. It involves considering observations *during or after* an experience to affect future practices. Reflection theories suggest that learning is supported when learners explore and monitor their own knowledge, when they think about how the meaning and application of new knowledge was used in their recent experiences, and when they explore application of their new knowledge to other contexts, beyond their immediate experiences. Thus, incorporating reflection principles into learning resources should prompt learners to engage more deeply in instructional content by supporting self-assessment, meaning-making, translating learning experiences into future practices, and testing implications and transfer of these concepts to new situations. This paper provides an overview of theoretical perspectives, practices, and research on reflection, summarizing points for the design of learning resources.

Reflective Thought, Reflection, and Learning

Dewey (1910/1997) defined reflective thought as active, persistent, and careful consideration of any belief or supposed form of knowledge. He further concluded reflection "is a conscious and voluntary effort to establish belief upon a firm basis of reason" (p. 6). Schön (1983) extended the view of reflection to describe it as a process of creatively responding to problems of practice in a manner that is both experiential and social. He distinguished between two facets of reflection. The first facet is observing thinking and action *as they are occurring*… calling this *reflection-__in__-action* (Schön, 1983). The second facet is observation *after an experience* in order to affect changes in future practice… calling this *reflection-__on__-action* (Schön,1983). Together, these two facets, suggest that reflection is a process (Coulson & Harvey 2013; Lucas & Fleming, 2012; Schön, 1983).

Wells (1999) went on to further explain the cognitive aspects of reflection arguing that reflection is a form of understanding or way in (mechanism by) which humans make meaning or sense out of new experiences. Boud, Keogh, and Walker (1985) suggested this meaning-making process guides actions and effective professional practices. They added to the definition by suggesting "reflection is the intellectual [cognitive] and affective activities in which individuals engage to explore their experiences leading to new understandings and appreciations" (p. 19).

Further it was suggested that reflection is "controlled by the learner, is purposeful, and involves cognition and affect in an interrelated and interactive way" (Yukawa, 2006, p. 206). Reflective thinking, that is, mentally engaging in cognitive and affective processes to understand conflicting factors in a situation, is a critical component in the learning process (Schön, 1991; Song, Koszalka, & Grabowski, 2005). This mental engagement results in an individual actively constructing knowledge [or cognition] about an experience in order to develop strategies to proceed to new experiences [or actions]. Learners reflect on their previous understanding of and feelings about an experience and their newly acquired knowledge to form a response. In effect, learners think about the multiple facets of the experience and reflect on how their newly gained knowledge can be used to inform ideas, behaviors, and practices applied from that experience to future actions (Song, Koszalka, & Grabowski, 2005).

There is posited to be a relationship among reflection, self-regulation, and metacognition. These processes together are perhaps best described as reciprocal and complementary, in that reflective capacity supports self-regulation and that self-regulation is required to support higher levels of critical reflection. Desautel (2009) described this relationship by suggesting that self-reflection aids self-knowledge development through a process of "making formerly unconscious, intangible, or reflexive processes or events explicit" (p. 2001). Thus, there is a critical relationship between reflection and higher order cognitive processes which in turn supports learning outcomes through experience (Eisenhardt, 1989; Harvey, et al., 2016).

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The potential outcomes of the reflection process – interaction between the individuals' conceptual skills and their environmental experiences – may include new perspectives on experience, changes in practices and behavior, readiness to apply new knowledge, and commitment to action (Boud, et al., 1985; Yukawa, 2006). Thus, goals of reflective practice are varied and contextually purposeful. Purposes for engaging learners in reflection may include prompting meaning-making, developing goal orientation, enhancing understanding of the importance of context, promoting attention to artifacts as the embodiment of socially constructed knowledge, identifying relationships between individuals and artifacts, facilitating small group-mediated learning, and engaging learners in the larger system of cognitive structures and representations. (Boud, et al., 1985; Schön, 1991; Yukawa, 2006).

Reflection Process – Stages, Levels, Purposes

Experience is comprised of ideas, feelings, behaviors, and environmental factors that affect these variables. Reflection is an individual critical thinking process based in experience (Yukawa, 2006). The reflection process itself is often described as consisting of three stages: (1) returning to an experience, (2) attending to feelings about the experience, and (3) reevaluating the experience (Boud, et al., 1985). In *returning to an experience,* during the first stage of the reflection process, the reflective practitioner recalls and deconstructs the elements of the experience. In the second stage, *attending to feeling*, the practitioner recalls and thinks about (reflects on) positive and obstructing feelings sensed during the experience and begins to identify and align previous and new feelings and knowledge while developing a better understanding of the occurrences in the situation. The reflective practitioner then enters into the third stage, *reevaluating the experience*. In this stage the practitioner engages in making new associations and meaning from the experience, integrating thoughts and feelings, validating new perceptions, and appropriating new behaviors, ideas and feelings into the practitioner's belief system. See table 1.

Table 1. Stages of Reflection

Stage	Defined	Processes	Learning
Returning to experience	Behaviors, ideas feelings	Uses positive feelings	Validates current level of understanding,
Attending to feelings	Integrates thoughts and feelings into learning	Use positive feelings, removes obstructing feelings	Validates new perceptions of content
Re-evaluating experience	Makes new associations, , ,	validates new perception	Appropriates new perceptions into belief system

Note: Based on Boud, Keogh, and Walker (1985).

Scholar disagree on the number of levels of reflection one enters in reflective thought. Reflection models generally range from three to five levels and also define reflection through different types and purposes (Harvey et al., 2016; Jay & Johnson 2001; Kember et al. 2000; Kreber & Castelden 2009; Larrivee 2008; Nelson Laird et al., 2014; Van Manen, 1997). However, each model does describe reflective practice as a cognitive process ranging from a shallow to a deep level of thought. For example, Harvey et al., (2016) suggested that reflective practice can range from surface to critical and transformative levels depending on the level of prompting and engagement of the individual. At the deeper and critical levels of reflection individuals are more likely to engage in thorough learning and experience better learning outcomes from reflective activities (Nelson Laird et al., 2014). Van Manen (1997) described three levels of reflection: technical, practical, and critical. Each level suggests a focus, process, and possible learning outcomes. See table 2.

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Table 2. Levels of Reflection

Levels	Defined	Processes	Learning
Technical	Examining skills, strategies, and methods used to research pre-determined goals	Thinking based on expected learning of content	Self-observation of learning content, single level learning-based on stated objectives
Practical	Focus on methods to reach goals and examining their own learning goals	Thinking based on own goals and level of knowledge of content and its immediate application	Modifying thinking based on personal goals, feelings, understanding of application, expanded learning to application of content to immediate context
Critical	Questions broader moral, ethical, and social assumptions	Thinking based on impacts of content application in other contexts	Expanding thinking to implications and application of content outside of learning context, may change meaning and level of understanding

Note: Based on Van Manen (1977)

Van Manen's (1977) three levels of reflectivity are widely used to distinguish between the three types of reflectivity. *Technical reflection* focuses on examining one's skills, strategies, and methods used to reach predetermined goals. Thinking processes are based on expected learning outcomes and aligned with stated objectives of the experience. *Practical reflection* focuses on the methods to reach goals and examine the goals themselves. At this level the individual begins to modify thinking and expand learning to the immediate application within the current context. At the *critical reflection* level, the individual is prompted to question the broader moral, ethical, and social assumptions underlying the goals, often expanding thinking and application to other contexts. With each level, from technical to critical, the individual develops a deeper understanding of their experiences and how new understanding can inform future thinking and action.

Finally, reflective practices have also been described as different types of interactions or used for different purposes (Fazey, et al., 2005; Matthew & Stemberg, 2009; Yukawa, 2006). For example, *tacit reflective practices* occur when the individual engages in inquiry about experiences without directly seeking personal feedback, rather sharing thoughts and ideas. Often through means of communicating and sharing during tacit co-reflection, reflective practitioners develop a deeper understanding of experiences by simply sharing and listening to others (Matthew & Stemberg, 2009; Yukawa, 2006). When managed well, this type of reflective sharing will support practitioners by bringing to surface tacit knowledge about their practice, thus adding to their learning experience (Smith, Kielly-Coleman, & Meijer 2010). When engaged in *active reflection* – seeking feedback from others – deep learning outcomes from conversations are much enhanced through specific co-reflections and feedback on each sharing individual's thoughts, ideas, and actions (Fazey et al., 2005; Yukawa, 2006). Thus, reflective practices support deeper learning with engagement at different levels of reflection (surface/ deep/ transformative), for different purposes (technical/ practical/ critical), and with reflections from multiple perspectives (self/ peers).

Prompting Reflection
Ultimately the value of effective reflective practices is that critical, or deep, reflection often leads to multiple types of learning (Boud et al., 1985; Desautel, 2009; Eisenhardt, 1989; Harvey et al., 2016; Wells, 1999). Prompting reflections may include helping individuals reach a level of transformative

learning where one's values, beliefs, and assumptions may be changed (or transformed) through higher levels of reflection (Coulson & Harvey, 2013; Hipkins, Reid, & Bull, 2010; Nelson Laird et al., 2014).

To this end, scholars believe that reflective thinking and practice may be taught and/or prompted (Eisenhardt, 1989; Larrivee, 2008; Moon 2004). It is key for instruction and educators to play a role in scaffolding reflection practices through effective cues, inquiry, and strategic instructional interventions and scaffolds (Eisenhardt, 1989). Many types of tools, strategies, and resources may be used to scaffold the development and practice of reflection. The choice of an appropriate strategy often depends on which of the stages students inhabit at a given time and can include approaches in establishing a shared understanding of the role of reflection, introducing reflective tools, providing debriefing guidelines (see Coulson & Harvey, 2013). Thus, research is important in determining appropriate strategies and conditions for supporting reflective practices that enhance learning.

Research Studies on Reflection

Researchers suggest that various strategies, or design elements, in the learning environment can prompt reflective thinking (Song, Grabowski, Koszalka & Harkness, 2006). For instance, learning experiences based on ill-structured, authentic, and complex tasks are known to promote reflective thinking when learners are prompted to reflect on specific aspects of their experiences in these situations. Such prompts may help learners to investigate disconnects in their experiences, aspects of complex problems that are new to them, and multiple forms of information that are not normally considered during an experience, in order to generate new ideas, thoughts, and behaviors to use in the future (Stepien & Pyke, 1997). However, different types of prompts for reflection influence the level of reflection differently for different types of individuals (Matthew & Stemberg, 2009; Song, Koszalka, & Grabowski, 2005; Song et al., 2006).

Studies on patterns of effectiveness of reflection prompts. In the context of middle school learners three factors in the learning environment were found to be predictive of reflection for younger children (Song, Koszalka, & Grabowski, 2005). The first factor suggested that using reflective teaching methods, e.g., teacher explanations and questions, was perceived as critical to reflective thinking. The second factor critical to reflective thinking was using specific types of scaffolding tools, e.g., questions, reflective writing.The third critical factor was the design of the overall learning environment, e.g., types and forms of resources, incorporation of collaborative learning, use of concept mapping, level of learner control, and complexity of learning activities. In this case the learning environment (factor 3) was found to be perceived by the young learners as most important, suggesting that student-centeredness of activities were best at prompting their reflection. However, a later study revealed different patterns of design factors that learners perceived as most helpful in prompting their reflection. One such finding suggested that the types of scaffolding methods and resources used in prompting reflective thinking were most important to college and adult audiences, whereas in younger learners the overall environment was perceived as most important (Song et al., 2006). Thus, reflection was successfully prompted using a variety of teaching methods, learning environments, and scaffolding tools, however the audience perception of these scaffolds played a role in their effectiveness (Song et al., 2006).

Studies on reflection practices. Some researchers have investigated the use of reflective portfolios and other reflective learning journal activities that engage learners in writing their reflections based on specified concepts, events, or interactions *(*Clarke & Adam, 2012; Larkin & Beatson, 2014; Thorpe, 2004; Wang & Zhan, 2010). These documents were thought to prompt students in gaining insights, awareness, and learning through reflection on their experiences (Thorpe, 2004). Students were able to create and share stories of their experiences and then reflect on their learning journey (Wang & Zhan, 2010). Through prompted reflective practice higher levels of engagement and motivation, critical thinking, self-expression, and development of communication and computer skills were achieved (Clarke & Adam, 2012). Results of Larkin & Beatson (2014), based on a staged development of the levels of reflection in student teacher participants, further suggested that unstructured reflections in the early weeks of the semester were largely descriptive. However, participants built greater awareness and confidence over time while providing the teaching support team with a general sense of their experiences through their reflections. They posited that

continued structured work in reflective practice supported student teachers in moving to richer reflections and higher levels of reflective practice over time (Clarke & Adam, 2012). The progression of structured to unstructured and collaborative sharing practice provided the participants with the skills and knowledge to become more productive in their reflective practices leading to a good mix of reflection and honesty, which enabled the students to grow into their role as reflective practitioners. Progressions in types of level of reflection enabled participants to focus on key aspects of their internships through their digital stories and with a deeper reflection possible they developed higher level digital skills (Clarke & Adam, 2012). Similar findings are echoed in other studies on reflection and skill development. See Coulson & Harvey, 2013; Fazey et al., 2005; Larkin & Beatson, 2014; Lucas & Fleming, 2012; and Passey & Hobrecht, 2001.

Studies on reflection prompts and feedback during reflection. Krause & Stark (2010) investigated whether using reflection prompts in instruction made a difference to learner reasoning. Some students were instructed simply to reflect on and record reasons for their decisions during instructional activities. Other students received no reflection prompts. The group with the prompting intervention achieved higher levels of learning and after further analyzing students' reasons it was found that prompted participants engaged in substantial reflective processes as opposed to the other group who did not have as high achievement or indicate any level of reflection. It was hypothesized that the act of recording reflections on rationale engaged participants in higher levels of thinking and enhanced their depth of understanding of their own experiences. In related studies instances of feedback during reflection were investigated.

Feedback is regarded as an effective means to promote reflective processes and enhance cognitive learning (Quintin & Smallbone, 2010; Schraw, Crippen, & Hartely, 2006). Feedback that is explanatory or corrective of thoughts generated and shared during reflection, provides further ideas for new reflections, and scaffolds cognitive engagement based on problem-solving experiences, can support more effective self-regulation and learning during reflection activities (Schraw, Crippen, & Hartely, 2006). In a study of multiple feedback, cooperation, and reflection strategies, feedback interventions clearly enhanced learning outcomes, whereas cooperative learning had no significant effect on learning. Perceived reflection was high in all participant groups, differences among groups were not significant (Krause & Stark, 2010). In another study, using a simple tool and process to engage learners in reviewing written feedback that would forward them to a new assignment, learners developed stronger tendencies to self-reflect regularly, shed inhibitory feelings prior to reviewing feedback (they were more open to comments), provide more evidence of their experiences that were found to prompt deep thinking and opening themselves to learning, and demonstrate the ability to create more comprehensive actions plans based on previous experiences (Quintine & Smallbone, 2010). Such findings suggested that preparing one's self for feedback on one's own reflections and engaging in feedback at multiple levels, e.g., independently, with peers, with instructors, can be supportive of enhancing reflection outcomes and lead to effective new behaviors.

Studies on online collaborative critical thinking. One additional area of recent study has been co-reflection. Co-reflection involves cognitive and affective interactions in synergy with relationship building. These studies identified evidence of the co-reflection as a core process in learning. During co-reflection learners are allowed to freely and easily create their own artifacts, adapt given or their own tools to communicate reflection and learn based on their own styles or preferences. The focus on reflection thus evolves as an individual critical thinking process, with co-reflection as a collaborative critical thinking process, and thus provides a synergy between the two processes. (Yukawa, 2006). Results of these co-reflective sessions suggest that participants become more fully engaged in higher levels of reflective practice, think about others experiences related to their own situations, and develop a larger set of learned behaviors they can use in future experiences. Such studies continue to help unpack the complexities of reflective processes in learning experiences.

Learning Resources Informed by Reflection - Possibilities

Instruction is a compilation of informational, instructional, and learning resources (Grabowski & Small, 1997), each providing a building block upon which to purposively support learning. Whereas informational and instructional resources support the overall content and direction of instruction, the

learning resources, whether in analogue, digital or social/human format fully engage learners in learning processes. By integrating reflection tenets, based on research and best practices, into learning resources students may more fully engage with content through self-assessment of understanding, application of new content to current learning situation, and through exercises to test application of new knowledge to experiences outside of the learning context. Embedding features like structured and unstructured portfolios or journaling, prompts to recall and share feelings from experiences, and question prompts into learning resources may support self-assessment and development of deeper understanding of content. Integrating co-reflection activities around commonly experienced problems and opportunities for both tacit and active reflection into learning resources may further support learners in determining how new knowledge can be used and/or applied to learning activities, while integrating ways to document reflection, e.g., digital stories may be supportive to learners extending their new knowledge to other contexts. The varied research results suggest that additional investigations are needed to examine the characteristics of reflection in support of informing the design and process of designing learning resources.

Synthesis

Reflection emphasizes that deep learning requires intellectual and affective participation in summarizing and rationalizing experiences. Reflective practitioners self-assess their understanding of experiences, think deeply about what they experienced, felt, and did during a learning or practice event, and use their experiences to inform ideas, thoughts, and actions they will take as they move forward to new experiences.

Instructional designers and informed educators create learning resources based on research and understanding of how individuals learn. Reflection theories suggests that learning is informed by reflective practice… higher levels of reflection are related to deeper learning. Learning resources that incorporate prompts and opportunities to engage learners in thinking about new knowledge and its application in and beyond instructional context have the potential to prompt meaning-making, application of new knowledge, and recognized value of new knowledge beyond the learning activities. Designing learning resources with tenets of reflection in mind suggest that such resources may engage learners in more deeply learning instructional content.

Learners actively reflecting on content during learning activities can validate and extend their knowledge and application of new content into meaningful and structured knowledge. Evidence suggests there are relationships between reflection, self-regulation, and deep learning. These studies supported reflection theories. However, reflection theory is only one dimension that may suggest features of learning resources that can help facilitate deep learning. Other factors may include the abilities of learning resources to engage learners in flexible thinking (Cheng & Koszalka, 2016), generative learning (Wilhelm-Chapin & Koszalka, 2016), and at appropriate types and levels of engagement suggested by expected learning outcomes (Yang & Koszalka, 2016). The RIDLR team is developing and researching learning resources that incorporate multiple dimensions to support higher order thinking and the development of learning assessments. See http://ridlr.syr.edu/.

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