Chapter 2.1[1]

Research and Theoretical Perspectives on Cognitive Outcomes of Service Learning

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Primary among the goals of higher education is learning that lasts, which Mentkowski and associates (2000) posit includes the "integration of learning, development, and performance" (p. 1). Although Mentkowski and associates do not explicitly mention service learning as a way to achieve learning that lasts, as explored in this chapter, the pedagogy of service learning has the potential to enhance intellectual development and related cognitive processes; the service learning experience can, in turn, be enhanced by the intentional inclusion of activities that are scaffolded and developmentally designed.

Well-designed service learning experiences serve as bridges between the curriculum and the world outside the classroom, where problems are ill-structured and the stakes are often high for communities and students alike. These opportunities build students' capacities to develop, use, and refine their knowledge, skills, and critical thinking abilities. The capacity for critical thinking requires a set of cognitive skills as well as personal dispositions that enhance confidence

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and good judgment in using these skills (Fascione, 1990). The disposition to engage in reflective critical thinking, which goes beyond pure cognitive skills, requires the development of a set of epistemic assumptions that are part of overall intellectual development (King & Kitchener, 1994). Extensive longitudinal research at Alverno College evaluated the relationship between intellectual development and cognitive process related to critical thinking and found that these were independent factors (Mentkowski & Associates, 2000). Whereas intellectual development reflects qualitative changes over time in epistemological understanding about the nature of knowledge and knowing and is necessarily connected to identity of oneself as a learner, cognitive processes are demonstrated in a quantitative way through more use or less use and are not necessarily connected to self.

Successful critical thinking requires both attainment of higher levels of intellectual development and the use of cognitive processes such as metacognition, transfer, and problem solving. These cognitive processes also advance students' intellectual development – a primary goal of higher education that contributes to success in college and beyond. Indeed, these processes underlie student outcomes in the arenas of academic learning (chapter 2.2), civic learning (chapter 2.3), personal development (chapter 2.4), and intercultural competence (chapter 2.5).

Service learning, when designed appropriately, has the potential to promote intellectual development and these associated cognitive processes by encouraging students to examine how they and others interpret and attempt to resolve ill-structured problems, by requiring them to integrate different perspectives (some of which contradict one another and are not easily reconciled), and by providing guidance in their reflection process as they co-construct meaning with academic and community experts and re-define themselves as learners and as agents of

social change. Given this potential, the purpose of this chapter is to review theory and research on intellectual development and on specific cognitive processes that interact with it to produce good critical thinking and to discuss implications of this work for service learning practice and research.

Theoretical and Conceptual Frameworks

This chapter is intended to be useful both to those interested in assessment for research on cognition in service learning and to those interested in assessment of student learning outcomes for program enhancement. Although the purposes of these two uses of assessment are different, they share best practices informed by psychology (Steinke & Fitch, 2011). Our approach begins with the assumption that high quality assessment is grounded in theory and research that can shape the articulation of outcomes, inform the development of appropriate instructional activities to cultivate those outcomes, provide direction for identifying indicators of those outcomes, emphasize the importance of using multiple measures to assess complex constructs, and clarify the interpretation of assessment results. Within this framework, the key difference between assessment for research and assessment for program enhancement is the purpose of the assessment. Assessment for enhancement can be viewed as action research to solve an immediate problem such as how to deepen student learning by improving service learning design. Faculty and other practitioner-scholars who begin assessing for enhancement may intentionally proceed in such a way that the work also advances their research agendas (Steinke & Fitch, 2007).

Selected theories and concepts that are relevant to the study of cognition in service learning are presented below. As shown in Figure 1, cognition encompasses intellectual development and critical thinking as constructs that are broader and more complex than specific

cognitive processes such as metacognition, transfer, and problem solving, which in turn are more

complex than specific cognitive skills such as inference, categorization, and deductive reasoning.

INSERT FIGURE 1 ABOUT HERE

Intellectual Development

Theories of intellectual development are grounded in epistemology, the study of the

nature of knowledge and knowing. Hofer (2001) defines personal epistemology as "beliefs about

the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where

knowledge resides, and how knowing occurs" (p. 355). Hofer and Pintrich (1997) review

various conceptualizations of personal epistemology – including such developmental models as

King and Kitchener's reflective judgment, Baxter Magolda's epistemological reflection, Belenky

and colleagues' women's ways of knowing, and Kuhn's argumentative reasoning as well as

Schommer's system of epistemological beliefs (which is not developmental) – and conclude that

all make reference to, and are derived from, original work by Perry. Steinke and Fitch (2003)

summarize Perry's model (see Figure 1):

> Perry's (1968/1970/1999, 1981) scheme of intellectual and ethical development
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> describes how college students' conceptions of knowledge, truth, learning and
>
> commitment evolve through nine positions within four broad stages, from
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> *Dualism* (i.e., all knowledge is known by the "right" Authorities and it is black
>
> and white; thus, Truth is absolute) through *Multiplicity* (i.e., knowledge includes
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> some "gray" areas and things we don't know yet; authorities disagree, thus any
>
> opinion is as good as another) and *Contextual Relativism* (i.e., knowledge is

constructed by learners in specific and limited contexts; the best opinions are

supported by quality evidence, thus standards exist to judge the adequacy of

opinions) to *Commitment Within Relativism* (i.e., commitments that reflect one's

identity – to an area of study, a career, a relationship, a value system – must be

made within an essentially relativistic world). (p. 183)

In this chapter the term intellectual development refers to the family of theories or models about

students' personal epistemology that are grounded in Perry's work. Hofer and Pintrich (1997)

report that regardless of which specific theory is used, the majority of studies investigating

intellectual development have found that students typically enter college in the epistemological

stage of dualism and leave in the stage of late multiplicity.

Critical Thinking and its Related Cognitive Processes

Fascione's (1990) report of consensus on the meaning of critical thinking concludes that

critical thinking represents a set of cognitive skills and affective dispositions, such as

inquisitiveness and open-mindedness, that provide useful insights and powerful resources for

personal and civic life. Paul and Elder (2008) use the following definition in their work with the

Foundation for Critical Thinking, "Critical thinking is the art of analyzing and evaluating

thinking with a view to improving it" (p. 2). Some of the recommendations in Fascione's report

that are particularly relevant here are that education be guided by a holistic understanding of

critical thinking that does not reduce it to a particular skill feature, that educational strategies be

designed holistically, and that critical thinking be taught in a variety of contexts.

Whereas the experts on critical thinking in Fascione's work identified a set of specific

cognitive skills including interpretation, analysis, evaluation, inference, explanation, and self-

regulation as components of critical thinking, this chapter focuses on more complex cognitive

processes related to critical thinking that have been the subject of cognitive and educational research: namely, metacognition, transfer, and problem solving. Each of these higher-level processes has a body of theory and research grounded in basic psychological science and a history of applied educational relevance and research. In addition, each is clearly implicated in service learning, and how they are enacted depends upon and subsequently interacts with a student's level of intellectual development: the higher the level of intellectual development, the more sophisticated is the use of these cognitive processes, and vice versa.

As shown in Figure 1, the relationship between cognitive processes and intellectual development is not simply correlative, but rather dynamic and synergistic: intellectual development is an ongoing process in which epistemological (i.e., Perry) level functions as a lens through which students interpret their experiences, which subsequently leads them to employ these three cognitive processes either more or less successfully (Steinke & Fitch, 2003). For example, students in dualism may find it difficult to apply what they learn in the classroom to their service learning experience, or this transfer may occur randomly or inappropriately based on the surface features of the two contexts. Students in multiplicity may be able to apply academic learning to service activities when given explicit guidance, as through structured reflection prompts. Those in contextual relativism, however, are most likely to transfer learning appropriately between classroom and community because they can identify the deep structural similarities and differences between these contexts. In turn, while using these cognitive processes in limited ways, students encounter situations in which their approach is not accurate or adequate, prompting them to question why. This doubt about their current understanding leads to the adaptation of assumptions about knowledge and knowing that is the core of

intellectual development and that, in turn, fosters the use of somewhat more sophisticated cognitive processes.

Metacognition. Both Fascione (1990) and Paul and Elder (2008) contend that teaching critical thinking includes helping students develop the ability and disposition to reflect on the process and quality of their own thinking, a phenomenon psychologists refer to as metacognition – broadly, thinking about thinking. Veenman, Van Hout-Wolters, and Afflerbach (2006) note that Brown and Flavell are typically credited with introducing the term metacognition, defined as "the knowledge about and regulation of one's cognitive activities in learning processes" (p. 3). They indicate that many terms—such as feeling of knowing, theory of mind, higher-order skills, learning strategies, meta-memory, and self-regulation—have been associated with metacognition and note that it can be difficult to separate metacognition from these other processes when assessing reasoning, particularly if these processes are not explicitly defined during task performance. Metacognition encompasses beliefs about the self as a learner in the context of a particular domain of knowledge. With respect to intellectual development, metacognition is an indicator of movement toward the stage of contextual relativism as it provides evidence of recognizing oneself as meaning-maker versus as a receiver of knowledge from the "right" authorities. The development of metacognitive skills also promotes transfer (Bransford, Brown, Cocking, Donovan, & Pellegrino, 2000).

Transfer. One characteristic of a good critical thinker is the ability to apply cognitive skills to a range of contexts for a variety of purposes, including personal and civic (Fascione, 1990). This ability to apply knowledge and skills from one context to another is known as transfer. Transfer is an important outcome in higher education because it determines whether the skills and content students learn in one academic setting can be used appropriately and

effectively in future academic, professional, or personal contexts. For this reason, Bransford et al. (2000) identify transfer as the "ultimate goal of schooling" (p. 73). Of particular importance is "far transfer," in which relevant knowledge and skills are appropriately applied in contexts that are clearly dissimilar to the ones in which they were learned (Barnett & Ceci, 2002). Typical dissimilar contexts experienced by students include the classroom, a service learning community setting, an internship, a job, a lab, a residence hall, and a favorite bar. Thus, the challenge of far transfer could be between any of these learning contexts. After decades of research on transfer, many questions remain, including the degree to which it regularly occurs (Bransford et al., 2000; Ritchhart & Perkins, 2005); however, transfer is more likely to happen when understanding is at a deep, structural level rather than a surface, replicating level and when knowledge and skills are organized around a conceptual framework (Bransford et al., 2000; Halpern, 1998). For example, students who have learned how to apply concepts of scaffolding and Vygotsky's zone of proximal development in a child development course (e.g., to case studies) are more likely to transfer these concepts to their service learning tutoring experiences. Seeing the relevance of a principle to multiple contexts allows a student to state the principle more abstractly (Wagner, 2006). Thus, appropriate transfer indicates recognition of context, and this insight reflects the epistemological transition from multiplicity to contextual relativism in Perry's scheme.

Problem solving. Learning critical thinking across contexts equips students to be able to apply critical thinking skills to a wide range of problems (Fascione, 1990). Problem solving not only involves finding solutions to problems that have already been defined but also recognizing new problems. As defined here, problems include those that are ill-structured and cannot be described completely or solved with certainty (King & Kitchener, 1994). Recognizing when problems exist is a key component of successful navigation of everyday events (Sternberg,

1997). Expert problem solving relies not only on well-organized knowledge but also on the ability to monitor one's own problem solving approach (metacognition) and flexible adaptation of knowledge to new situations (transfer) (Bransford et al., 2000). Because ill-structured problems necessarily involve ambiguity, students at the lowest levels of intellectual development likely will not demonstrate good problem solving skills across multiple problem types.

Relevance of Intellectual Development and Cognitive Processes to Service Learning

Collaboration with others in the community, guided reflection on service learning experiences, and working on authentic ill-structured issues and problems in the community that are relevant to academic content are specific aspects of service learning that, taken together, have the potential to promote outcomes related to enhanced intellectual development and critical thinking. Ideally, service learning creates opportunities for shared cognition or active social construction of knowledge as students collaborate with others in the classroom and the community. In both settings students encounter people who think differently than they do about what they know and how they know it, who make different assumptions about knowledge and truth, and who define and approach problems in different ways. In other words, collaboration during service learning exposes students and those with whom they interact to other ways of knowing, which has the potential to enhance intellectual development.

Engaging in critical reflection in relation to a community-based service experience also helps students identify themselves as agents in their own learning, not simply receivers of knowledge from authorities. According to Mentkowski et al. (2000), the use of metacognitive strategies, which can occur in the structured critical reflection that is part of service learning, can stimulate evaluation of one's own performance and potentially transform the learning process into one that may eventually lead to a consistent pattern of self-regulated learning. In turn, this

process can enhance intellectual development as students learn to claim their own perspective while situating it within the context of multiple divergent perspectives.

At its best, service learning can create what Ritchhart and Perkins (2005) refer to as "cultures of thinking" (p.792), a term they use to describe outcomes of pedagogies that make thinking visible by engaging students in opportunities for socially constructing knowledge with others and for using critical thinking skills to address meaningful problems. They cite examples such as cognitive apprenticeships, learning communities, and inquiry-based teaching and note that

> at the heart of these efforts lies reflection on one's thinking and cognitive
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> monitoring, the core processes of metacognition. Ultimately, teaching students
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> to be more metacognitive and reflective, providing rich opportunities for
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> thinking across various contexts, setting up an environment that values
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> thinking, and making the thinking of group members visible contribute a great
>
> deal to the formation of a culture of thinking. (p. 794)

As established above, service learning also has this potential.

Critical Evaluation of Past Research

Large-scale studies have reported positive effects of service learning on cognitive outcomes. Astin, Vogelgesang, Ikeda, and Yee (2000) conducted national longitudinal studies and found increases in self-reported critical thinking among students who participated in service (both service learning and community service) compared with those who did not, though this effect was stronger for the students who had taken service learning courses (Astin & Sax, 1998; Astin, et al., 2000). Eyler and Giles (1999) found that students involved in service learning reported greater openness to new perspectives (related to intellectual development and critical

thinking), deeper understanding of the complexity of social problems (related to intellectual development, critical thinking, and problem solving), and stronger ability to apply class material to such problems (related to transfer) than those not involved in service learning. The presence of service learning by itself did not increase critical thinking as measured by an intellectual development index; however, it did when its design included a high level of integration into course activities through regular application of relevant material and high-quality reflection. Eyler and Giles (1999) address the critique that perhaps a highly integrated service learning experience simply supports students' current level of intellectual development with the following interpretation:

> Critical thinking … is dependent on both knowledge and the students' level of cognitive [intellectual] development (p. 101) . . . . Whether a semester of well-integrated, highly reflective service learning helps students consolidate or exhibit previous gains or helps them develop to a higher level, the findings support the value of service learning in intellectual development (p. 125).

Novak, Markey, and Allen (2007) conducted a meta-analysis of cognitive outcomes of service learning in higher education. Nine studies met the criteria for inclusion in the meta-analysis because they compared service learning and non-service learning groups and included quantitative measures of cognitive outcomes (some self-reported by students), specifically understanding of course material, application of knowledge and skills across settings, and/or reframing complex social issues. Of these, application is most relevant to this discussion as it reflects the cognitive process of transfer, though understanding and reframing may implicate intellectual development, critical thinking, and problem solving. They found that for all three outcomes combined, the average advantage of service learning was a statistically significant

though moderate effect. This meta-analysis included some studies that relied on self-reported outcomes and some that lacked information about whether students chose service learning courses or were randomly assigned, both important limitations.

Four studies that were not included in this meta-analysis investigated intellectual development as an outcome and found small pretest-posttest increases in measures of students' cognitive change in courses with well-integrated service learning. The consistency of these results is notable given that the investigators used three different Perry-based measures of intellectual development: Learning Environment Preferences (LEP) (Fitch, 2004), Measure of Epistemological Reflection (MER) (Wang & Rodgers, 2006), and two Reflective Judgment (RJ) indexes labeled critical thinking (Eyler & Giles, 2002; Li & Lal, 2005). One challenge with assessing intellectual development is that it may change slowly and, therefore, gains are rarely seen over one semester (Eyler & Giles, 1999).

In the authors' review of studies that investigated critical thinking, four that were theoretically grounded in Paul and Elder's (2008) model all showed increases over time as measured by pre-post comparisons of written reflection products for students involved in well-integrated service learning experiences (Ash, Clayton, & Atkinson, 2005; Jameson, Clayton, & Bringle, 2008; Pinzón & Arceo, 2005; Sedlak, Doheny, Panthofer, & Anaya, 2003). None used comparable control groups. Two studies that used Fascione's (1990) theoretical approach found opposite effects of community-based learning (not service learning, per se, because the projects did not include reciprocity with community partners) on critical thinking. Quitadamo, Faiola, Johnson, and Kurtz (2008) reported pretest-posttest increases in California Critical Thinking Skills Test (CCTST) scores for student groups who conducted biology research on pressing community needs such as water quality and amphibian decline using community-based inquiry

(CBI) compared with those in partial-CBI or no-CBI groups. By contrast, Nokes, Nickitas, Keida, and Neville (2005) found pretest-posttest decreases in California Critical Thinking Disposition Inventory (CCTDI) scores, especially in self-confidence, for a small voluntary sample of nursing students after completing their required clinical practicum. Furco's reminder (as cited in Sedlak et al., 2003) that "service learning is not the same as clinical experience" (p. 103) is one possible explanation for this negative outcome. Additionally these opposite effects could be attributed to differences between the direct, objective CCTST measure of critical thinking skills as applied to specific problems, arguments, or materials (interpretation, analysis, evaluation, inference, explanation, and self-regulation) and the indirect, self-report CCTDI measure of dispositions (inquisitiveness, open-mindedness, truth-seeking, flexibility, self-confidence, maturity) in which test-takers rate their level of agreement with a series of statements about critical thinking-related attitudes and values. The latter are subject to response-shift bias if students' standard for evaluating themselves shifts between the pretest and posttest as a function of the service learning intervention itself. As Howard (1980) explains, unless a retrospective pretest is used, it is impossible to determine whether self-reported changes are actually due to the intervention (here, service learning) or to this shifting self-evaluation standard.

Three studies found evidence of transfer by service learning students via application of course material, which would be considered far transfer, as defined above by Barnett and Ceci (2002). Each used analyses of students' narrative responses about social problems in journal reflections, essay exams, or focus groups, and in each course in the study service learning was well-integrated. Only Batchelder and Root (1994) used a non-service learning control group, and they reported more positive outcomes for service learning students than for non-service

learning students, especially for those who received high-quality supervision compared with those who received low-quality supervision at their service learning site. Two of these studies (Batchelder & Root, 1994; Hirschinger-Blank & Markowitz, 2006) also reported that service learning students demonstrated greater understanding of the complexity of social problems, an outcome related to critical thinking, intellectual development, and problem solving than those who did not do service learning. Govekar and Rishi's (2007) four-year longitudinal study of two undergraduate business courses noted that some students found the inherent ambiguity in service learning projects particularly challenging, a finding that would be consistent with the hypothesis that ill-structured problems are more difficult for students at lower levels of intellectual development.

Metacognition was explicitly assessed in only one study, which found improvement on the Learning and Study Strategies Inventory (LASSI) over two years for students in problem-based learning groups compared with students matched on demographic characteristics who were not involved in problem-based learning (Downing, Kwong, Chan, Lam, & Downing, 2009). Problem-based learning and service learning are similar in their use of authentic ill-structured problems; thus, service learning students might be expected to show similar gains. Finally, Parker-Gwin and Mabry (1998) compared three types of service learning placements (whole class; individual, required service; individual, optional service) on students' self-assessments of critical thinking and analytic and problem solving skills; they found only the whole-class group reported improvement over the semester. This finding was unexpected because structured reflection was used less often in this group than in the two individual-placement service learning conditions, however, it is conceivable that in the whole-class placement condition more unstructured reflection occurred through class discussion and student interaction within or

outside of class than in the individual-placement groups. On the other hand, both of these studies reported gains in metacognition for students involved in group-based learning, which supports intellectual development theories about the benefits of co-construction of knowledge for seeing oneself as a meaning-maker rather than simply as a receiver of knowledge (Hofer & Pintrich, 1997; Perry, 1970/1999, 1981).

Overall, these empirical investigations of cognition in service learning and related pedagogies support the importance of well-integrated service learning, the role of critical reflection, and assessment methods that are grounded in theory.

Measurement Approaches: Existing Tools and Suggested Strategies

There is no single approach to measurement that will provide a complete understanding of complex cognitive processes such as metacognition, transfer, or problem solving. Steinke and Fitch (2007a) provide a table of selected tools used to assess the cognitive outcomes of intellectual development, critical thinking/problem solving, and knowledge application/transfer. They suggest that measurement approaches to assess cognitive outcomes of service learning would be strengthened with a shift from indirect, self-report of students' perceptions to direct and/or mixed measures of students' performance. Self-report is generally considered to be an indirect approach to assessment because it does not directly measure what students know or can do but rather what students believe they know or can do. Mixed measures still rely on some form of self-report, but students' responses are scored using external criteria developed by someone with expertise in the field to directly assess the quality of students' thinking in a way that aligns with a specific theory. Examples described in Hofer and Pintrich (1997) are the Measure of Intellectual Development, the Measure of Epistemological Reflection, and the Reflective Judgment Model coding procedure.

To facilitate assessment of students' optimal learning as represented by products that reflect students' best efforts, assessment tools that are course-embedded are preferable. This approach requires researchers to attend to the assignments used to develop and assess cognitive outcomes. Quitadamo et al. (2008) provide an example of incorporating multiple course-embedded tools in their study of community-based inquiry classes, including small-group proposals for a community-based scientific research project, peer evaluations, and reflective journals; these assignments both fostered and assessed student learning. Course-embedded direct measurement tools to assess cognitive outcomes are most valid as indicators of higher order thinking when they use systematic processes for eliciting and scoring student products of critical reflection. Being intentional about how best to systematize approaches to generating and assessing these products is crucial to good outcomes assessment research. Ash and Clayton (2009) demonstrate the value of connecting assessment approaches and learning outcomes to theory and of incorporating assessment into and throughout service learning courses to improve and document student learning outcomes (chapter 2.2). Teaching and student products can also be intentionally aimed at having students reflect upon the quality of their own thinking (metacognition), the application and abstraction of their knowledge (transfer), or how they approach everyday challenges (problem solving).

Course-embedded systematic assessments such as context-specific problems or cases (Pinzón & Arceo, 2005; Steinke & Fitch, 2007b) provide a consistent protocol that may be integrated into service learning courses and that can used to promote discussion and development of critical thinking (Quitadamo et al., 2008). Two examples of such standardized protocols for assessing cognitive outcomes of service learning are the Problem Solving Analysis Protocol (P-SAP) (Steinke & Fitch, 2007b) and the DEAL (Description, Examination, Articulation of

Learning) model of critical reflection (Ash & Clayton, 2009). The P-SAP starts with a course-related issue or problem and asks students to write their thoughts about the causes of and solutions to the problem through a series of directed questions. One example of an issue used in "Environmental Economics and Public Policy" is: "Even when recycling is encouraged people often do not comply." Another example used in "Adaptive Physical Education" is: "Teaching units for physical education are rarely designed with the needs of special populations in mind." The prompts presented after the statement of the issue are: (a) Do you consider this to be a problem? If yes, explain how it is a problem. If no, explain how other people might consider it to be a problem.; (b) What do you or other people think causes this problem?; (c) What do you or other people think could be done to try to solve this problem?; and (d) What are the strengths and limitations of these possible solutions to this problem?

The DEAL model guides participants through critical reflection in three sequential steps. Step one involves "Description of experiences in an objective and detailed manner"; step two involves "Examination of those experiences in light of specific learning goals or objectives"; and step three involves "Articulation of Learning, including goals for future action that can then be taken forward into the next experience for improved practice and further refinement of learning" (Ash & Clayton, 2009, p. 41). Each step is structured with prompts, and in the Examine step those prompts are aligned with the particular academic, civic, and personal growth learning goals of the service learning component of the course, generally expressed as assessable Bloom-based learning objectives.

Both protocols can be used repeatedly throughout a course and both include rubrics that can be applied to student products to assess cognitive outcomes. For example, both rubrics have multiple scoring levels and multiple criteria (locus and complexity for the P-SAP and two sets of

critical thinking criteria for DEAL). The P-SAP has seven scoring levels for locus and four

levels for complexity and includes descriptions and examples for each level. DEAL has four

scoring levels on one rubric and six on another and includes descriptions of each criterion at each

level. Rubrics such as these two incorporate properties of good measures, such as clear, precise

descriptions of performance that vary in degrees of quality and reflect specific outcomes.

Given the importance of measurements aligning with pedagogy and the importance of

teaching for transfer, assessing cognitive outcomes of service learning will be most relevant if

they are applied to authentic products that allow students to demonstrate their knowledge and

skills and their ability to apply material to new problems and contexts in out-of-classroom

settings. Portfolios provide a way of assembling a range of products from courses in various

disciplines as well as from community-based projects. These products can be assessed with tools

that are broad enough to be employed on a variety of assignments. The Association of American

Colleges and Universities' (AAC&U, 2010) VALUE Rubrics, designed to assess common

general education outcomes, are examples of such tools. Particularly relevant to this discussion

are the rubric to assess integrative learning skills, which includes transfer, reflection, and self-

assessment among its components, and the rubrics to assess problem solving and critical

thinking.

Implications for the Practice of Service Learning

This review of service learning research as well as the literature on intellectual

development and cognitive processes provides direction for how service learning practitioners

might use the pedagogy to enhance intellectual development, critical thinking, metacognition,

transfer, and problem solving. One of the best ways to enhance student performance is to use

assessments that provide a basis for feedback to students on those dimensions. Whether for

research or for evaluation of student performance in the course, optimal student performance is more likely when results are not only useful to the researcher or instructor but also provide useful feedback to the student (Steinke & Fitch, 2003). This feedback could take the form of a comparative profile or a summary of strengths and weaknesses and could be distributed to each participant or used as a topic of class discussion. Feedback can also be integrated into the course when using critical reflection tools such as the DEAL model or the P-SAP by sharing and discussing the rubric that is used to assess reasoning demonstrated in the reflection products and/or by providing opportunities for students to continue deepening their thinking through feedback-informed revision of draft products. Indeed, in order to develop the metacognitive skills needed for critical thinking, students must be able to evaluate their own progress toward the goals or outcomes of the learning experience (Loacker, 2000). Shifting the focus from teaching to student learning is an important component of the constructivist approach (Huba & Freed, 2000) and begins by clarifying learning outcomes and sharing these with students (Ash et al., 2005; Loacker, 2000).

Making incremental adjustments to teaching and learning strategies based on students' cognitive understanding is consistent with the developmental principle of scaffolding (Rogoff, 1990). In building construction, the purpose of a scaffold is to enable one to reach higher than one could without it, and the same dynamic occurs in student learning and development. Service learning instructors can intentionally cultivate cognitive outcomes by employing developmental course design. Moore (1994) describes Knefelkamp and Widick's model of developmental instruction, which integrates Perry's (1970/1999) scheme with Sanford's (1962) concept of balancing challenge and support and applies them to the design of activities, courses, and ultimately curricula. The model identifies four variables (diversity, structure, involvement,

personalism) that can challenge or support students differently depending upon their level of

intellectual development. For example, students at lower levels are challenged by high diversity

in a course (e.g., multiple readings, many perspectives) and feel supported by high structure

(e.g., clear expectations, rehearsal of evaluation tasks), whereas those at higher levels seek out

high diversity and require less structure in order to successfully master the material.

The model of developmental instruction suggests that students at any level benefit from

involvement in active learning methods (e.g., problem-based learning, service learning,

collaborative learning) and personalism (e.g., instructor availability, small group discussion),

although those at higher levels of intellectual development need these strategies less than those at

lower levels. One implication of developmental instruction for service learning practice is that

while students at lower levels of intellectual development may be supported by service learning

as an active learning method, they are often challenged by the diversity of perspectives and

ambiguity of expectations they encounter in their service learning experiences. For these

students, instructors can balance this challenge with higher structure (e.g., specific reflection

prompts, models of completed assignments) and personalism (e.g., comprehensive/timely

feedback on reflection products, sharing reflection products with other students for the purpose

of feedback). This analysis is consistent with Eyler and Giles' (1999) conclusion that whether

service learning students see the complexity of social problems as "a revelation that enhances

their service or as a barrier that discourages them may depend to some extent on their intellectual

development" (p. 101).

Guided reflection also enhances critical thinking about the complex issues service

learning students encounter (e.g., Ash et al., 2005; Grossman, 2008; Jameson et al., 2008).

Given the importance of metacognition, transfer, and problem solving, practitioners may need to

re-examine the role of reflection in their service learning courses to ensure that their reflection

strategies enhance critical thinking. Reflection activities can encourage students not only to

make meaning of the service learning experience in the context of course content but also to use

course content to solve problems they encounter in the community and to examine their own

ways of knowing, learning, and self-regulating. When students are able to identify, evaluate, and

take responsibility for their own cognitive processes, they will be more likely to develop the core

skills and dispositions that characterize good critical thinkers (Fascione, 1990).

Students taking responsibility for learning broadens the focus of learning from the

immediate context only to encompass the student's ability to learn in a multitude of contexts

(Mentkowski & Associates, 2000). Using service learning to teach students to transfer

knowledge and skills across multiple contexts requires instructors to be comfortable with

students' disequilibrium and failure, even when students are not. Instructors can help teach

problem solving skills and enhance intellectual development by modeling a willingness to try

new ways of approaching ill-structured problems and articulating the process by which they

evaluate potential solutions and learn from mistakes (King & Kitchener, 1994). Another way to

enhance problem solving and intellectual development is to encourage students to view problems

from a variety of perspectives while suspending their initial judgments (King & Kitchener,

1994). Instructors can help model this process by not forming conclusions until they have

considered all aspects of an issue and then not sharing with students their own conclusions until

they have explored all aspects of the issue with the class.

Implications and Recommendations for a Future Research Agenda

A viable research agenda on cognition in service learning will use theory and research on

intellectual development and cognitive processes to develop research questions, measures, and

designs that address why and under what conditions service learning enhances intellectual development and cognitive processes. It is insufficient for future research to demonstrate merely that enhanced cognitive outcomes in a particular context are related to the presence of service learning. What is needed is research that provides evidence of the role service learning can play in the sustained growth of students' intellectual development, critical thinking skills, and related cognitive processes, as well as the role these cognitive processes play in the effectiveness of service learning and performance beyond college. The research agenda proposed here is predicated on the evidence that cognitive processes and high-quality service learning experiences mutually reinforce each other.

Methodological Implications and Recommendations

Steinberg, Bringle, and McGuire's chapter in this volume (chapter 1.2) explains how the quality of service learning research can be enhanced by paying closer attention to issues of research design, measurement, and theory. While large-N, randomized control group designs are often held up as the gold standard of explanatory quantitative investigations, most researchers have difficulties conducting those studies due to limited resources, access to populations, and authority over administrative processes such as registration and staffing. Higher education practices frequently do not lend themselves to this level of control. Bringle and Hatcher (2000), however, suggest that researchers must explore using designs and procedures that reduce confounds and maximize control within limited parameters. Furthermore, complex cognitive processes do not lend themselves to single measures (Steinke & Fitch, 2011). How then might scholars improve research on cognition in service learning under such conditions?

Beyond just better attention to research design and measures, researchers and practitioners should become more intentional about the outcomes they are cultivating and

investigating. Much of the research in service learning does not clearly define the critical

components of the course, the outcomes being investigated, or how and why the course

components are related to the outcomes. Future research can make stronger connections between

service learning course design and anticipated cognitive outcomes, to demonstrate the

effectiveness of intentionally designing the course to meet those outcomes rather than expecting

service learning to deliver learning gains automatically (Ash et al., 2005). Furthermore, when

working with complex cognitive outcomes, researchers need to be clear about the indicators of

the outcomes they wish to measure (Steinke & Fitch, 2011) and which of these are likely to

change during the time frame of an investigation. For example, the AAC&U critical thinking

VALUE rubric identifies the following criteria or indicators for critical thinking: explanation of

issues, evidence, influence of context and assumptions, student's position and conclusion, and

related outcomes. Using common criteria for outcomes across institutions as can occur with the

use of the VALUE rubrics allows research to be conducted collaboratively with multiple

researchers all providing data from their own institutions.

　　　Another recommendation is to design studies that use regression and predictive/structural

equation modeling analyses. Such procedures measure and attempt to account for the natural

multicollinearity (i.e., redundancy) within the often complex relationships between latent and

observed variables. These analyses could provide a basic framework for creating latent variable

models to use for research on the relationships between service learning, intellectual

development, and cognitive processes, and how they change across time. This recommendation

suggests the importance of using mixed methods in which qualitative data can enrich findings

from quantitative analyses and provide some degree of reliability across methods.

Moreover, research on cognitive outcomes of service learning should move beyond one-shot designs. As Jameson et al. (2008) suggest, learning outcomes can also be assessed across the curriculum, examining either the intended or unintended cumulative effects across several courses. How can a well-structured curriculum that incorporates service learning across multiple courses cumulatively build gains in intellectual development, critical thinking, and other cognitive outcomes? These types of questions often require longitudinal analyses that assess the degree to which a focus on enhancing intellectual development and cognitive processes through service learning will develop the type of self-regulated learning that leads to optimal performance beyond college (Mentkowski & Associates, 2000) and help students to construct a world in which they see themselves as active agents in communities.

Some Recommendations for Future Research

The theories about intellectual development and cognitive processes reviewed in this chapter suggest directions for future research that will enhance pedagogical practices as well as understanding of the theories themselves. We offer three different designs to investigate research questions on cognition in service learning.

Experimental design. A pretest-posttest, randomized, control-group design could be used to examine a research question such as: How much guided reflection is needed to enhance cognitive (or other) outcomes of service learning? The basic design would involve randomly assigning service learning courses that are comparable (e.g., content, integration of service learning) to varying amounts of guided reflection through the use of tools such as the DEAL or P-SAP and measuring outcomes before and after service learning. The independent variable would be the frequency with which a guided reflection tool is integrated into the course and would vary from never (control) to occasionally or often (two or more experimental groups).

The dependent variables would include critical thinking and problem solving as measured by the rubrics associated with the reflection tools themselves (critical thinking for DEAL and problem solving for P-SAP) as well as by the parallel VALUE rubrics for critical thinking and problem solving, which would provide measures for convergent validity. The control group would only be measured before and after service learning, whereas the course-embedded reflection tools would provide additional mid-course assessments for the experimental groups. Intellectual development is a slow, incremental process, and it may take longer than a single course to detect changes in this outcome, so we recommend measuring it over at least one year. Researchers who have access to large populations of students and multiple sections of comparable service learning courses could use a true experimental design, whereas those who have limited access to these conditions would need to use a quasi-experimental design and attempt to control statistically for potential confounding variables.

Predictive modeling design. Figure 2 illustrates a broad conceptual model that could be used as a starting point to investigate the question: Under what conditions does service learning promote intellectual development and the types of cognitive processes that are the foundation of self-regulated learning? In this model, initial levels of cognitive processes and intellectual development are posited as exogenous variables or characteristics and abilities that students bring with them and that affect how they approach service learning experiences and potentially what they get out of them. As such, we propose that they function as moderating variables, along with the quality of the service learning experience. High quality service learning—characterized by critical reflection, service that is meaningful and academically relevant, and opportunities for students to co-construct knowledge with others in academic and community contexts (Eyler & Giles, 1999)—is expected to further enhance initial use of cognitive processes

and intellectual development level. We hypothesize that the interaction of all three variables will predict self-regulated learning. Tracking how these variables are related to each other and how these relationships change over time and across contexts using structural equation modeling would enhance the understanding of both theory and practice regarding the development of cognitive processes. In keeping with standard practices employed in predictive modeling designs, each variable would be associated with one or more measures, many of which have been discussed previously in this chapter.

Developmental design. The developmental instruction model (Moore, 1994) supports the hypotheses that development of critical thinking and related cognitive processes of transfer, problem solving, and metacognition are dependent upon a student's level of intellectual development (as illustrated in Figure 1), and it suggests that intellectual development functions in part as a moderator of cognitive processes, which then facilitates further intellectual development and more effective cognitive processes in an iterative fashion. Moreover, service learning has the potential to enhance intellectual development and cognitive processes, and the extent to which it does so likely depends upon how it is designed. Questions that could advance this aspect of a research agenda on service learning include the following: How does a student's level of intellectual development function as a lens (i.e., mediating or moderating variable) for interpreting and responding to challenges and supports encountered in the service learning experience (e.g., level of structure in reflection activities and at the service learning community setting; diversity of course material in terms of number and complexity of ideas; diversity in types of people and settings encountered in the service learning experience; degree of problem definition in service learning experience and in academic course; level of personal relationships with professor and with people in the service learning setting; opportunities for co-construction

of knowledge with other students, academics, and community members; level of concrete, face-to-face versus vicarious, imagined involvement with the course instructor and with the community), and how does intellectual development, in turn, affect cognitive processes?

These interrelated research questions would best be addressed by a series of smaller investigations leading up to a long-term study similar to that conducted by Mentkowski and associates (2000), but employing a full cross-sequential design that includes multiple cohorts measured over time at regular intervals during and after college. It would require measuring the developmental instruction model (Moore, 1994) characteristics (structure, diversity, involvement, and personalism) of particular service learning and comparable non-service learning courses, as well as students' intellectual development levels and cognitive processes relevant to expected course outcomes. Ideally, this study would use both quantitative and qualitative measures, including some course-embedded assessments, and would compare outcomes of service learning in discrete courses with outcomes from courses where service learning is linked across the curriculum (Jameson et al., 2008). This sequential design would also employ structural equation modeling. If our hypothesis is supported, intellectual development level should moderate the effects of service learning on cognitive outcomes, depending upon the developmental instruction characteristics of the experience. For example, students at lower levels of intellectual development should demonstrate more positive cognitive outcomes if service learning experiences are more structured, if diversity of course material is more limited, and if they receive more frequent and personal feedback on their reflection products, whereas students at higher levels of intellectual development should perform equally well under conditions of lower structure in service learning experiences, higher diversity of course material, and less feedback from the professor on reflection products and perhaps more

from peers and community partners. At this level students' learning is more self-regulated and reflects recognition of oneself as a meaning-maker, an insight tied ultimately to identity.

Summary and Conclusions

This chapter provides direction for exploring connections between the design of service learning courses, intellectual development, and cognitive processes. Recommendations are offered for measures, designs, and questions to enhance research on cognition in service learning and to encourage researchers to learn from best practices in outcomes assessment. High quality assessment can develop into high quality research when faculty and other practitioner-scholars take ownership of the process and integrate it into their professional development (Hutchings, 2010; Steinke & Fitch, 2007a); in turn, high quality research can provide useful recommendations for program and course enhancement.

This chapter also discusses the relationships among these variables in the context of high quality service learning. Moreover, all of the processes under discussion here—intellectual development, critical thinking, metacognition, problem solving, and transfer—are essential components of self-regulated learning that lasts beyond college and that undergirds responsible and effective engagement with communities. Furthering research on cognition in service learning as outlined in this chapter will open doors for better understanding of the relationship between these outcomes and learning that lasts.

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Start studying Theoretical Perspectives and Research. Learn vocabulary, terms and more with flashcards, games and other study tools. Theoretical Perspectives and Research. STUDY. Flashcards. Learn. Write. Spell. outcome or consequence of behavior that affects likelihood of behavior occurring in the future. two types of stimuli. reinforcement and punishment. behavior modification. formal technique for promoting the frequency of desirable behaviors and decreasing the incidence of unwanted ones. Social-Cognitive Learning Theory. Albert Bandura. learning occurs by observing others and watching the consequences of their behaviors. Learning can be indirect and invovles cognitions. Cognitivist framework. Service-learning is an experience-based approach to education and learning that has a set of diverse learning outcomes. Because of the uniqueness of its pedagogical approach and breadth of potential learning outcomes, management and business scholars have recognized its value. Much theory and supporting research has been generated on the effect of service-learning on college and university students. We conclude with a discussion of the theoretical and practical implications of these findings along with suggestions for future research. Learning Outcomes of Service-Learning. â€¦ Studies Included in the Meta-Analysis (Number of Studies 40). â€¦ Figures - uploaded by Patrick L. Yorio. Learn what is cognitive learning and how it can help employees handle complex tasks. Discover cognitive learning theories and their examples. During training in your workplace, this type of learning comes in handy where you get a deeper understanding of new information by being active and responsive to the speaker. 6. Non-Associative Learning (Habituation and Sensitization). It is a type of learning that enables humans to adapt to something by facing it frequently. When you get a new job at a factory where there are many machines making noise, it irritates for the first few days, but you later learn how to live with it. This is known as habituation. Example-based learning has been studied from different perspectives. Cognitive research has mainly focused on worked examples, which typically provide stud. Cognitive research has mainly focused on worked examples, which typically provide students with a written worked-out didactical solution to a problem to study. Social-cognitive research has mostly focused on modeling examples, which provide students the opportunity to observe an adult or a peer model performing the task. The model can behave didactically or naturally, and the observation can take place face to face, on video, as a screen recording of the model's computer screen, or as an animation. Learnersâ€™ cognitive load during the learning task was addressed by secondary task performance, prosodic speech parameters (pauses, articulation rate), and physiological markers (heart rate, skin conductance response). While results revealed increasing primary and secondary task performance over the trials, decreases in speech and physiological parameters indicated a reduction in the overall level of cognitive load with task progression. In addition, the robustness of the acquired schemata was confirmed by a transfer task that required participants to apply the obtained symbol combinations. Looking back in the history of cognitive psychology, there is a long research tradition on cognitive schemata as crucial outcomes of learning processes (Ghosh & Gilboa, 2014).