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Recommended Citation
Kennedy, H. R., & Gruber, A. H. (2020). Critical Thinking in a Service-Learning Course: Impacts of Information Literacy Instruction. *Communications in Information Literacy, 14* (2), 205–226. https://doi.org/10.15760/comminfolit.2020.14.2.3

Critical Thinking in a Service-Learning Course: Impacts of Information Literacy Instruction

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Abstract

It is well demonstrated that service-learning positively impacts a variety of student outcomes. However, methodological limitations have contributed to a lack of clear understanding of the mechanisms through which these effects occur. Additionally, little research has connected information literacy instruction explicitly with outcomes in service-learning courses. The present study used a pre-/post-test design to investigate cognitive outcomes, including critical thinking, using the Problem-Solving Analysis Protocol (P-SAP). Fifty-nine students from an undergraduate family services course participated. Results highlight the importance of library instruction to students' critical thinking skills and suggest implications for collaborations between discipline faculty and library faculty in service-learning courses.

Keywords: information literacy instruction, critical thinking, service-learning, family services, problem-solving

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The present study stems from a collaborative project between family service and library faculty. The first author/instructor (Kennedy) was responsible for redesigning and teaching a foundational course for family studies majors which included a service-learning project, and the second author/librarian (Gruber) provided information literacy instruction. Service-learning and other experiential pedagogies are often emphasized in family services to help students develop academic, social, and interpersonal skills, including cultural competence (Hall & Morris-Compton, 2018; Hamon & Way, 2001; Jacobson et al., 2011; Long et al., 2018). Students in the course volunteered with local non-profit organizations providing social services.

Service-learning has been identified as an effective educational strategy (Mandell et al., 2014). It is generally considered to be an "educational experience in which students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility" (Bringle & Hatcher, 1996, p. 222). According to Eyler et al. (2001), service-learning has been associated with positive impacts on many student outcomes and across multiple domains (personal, social, cognitive, and professional).

However, after teaching the course, Kennedy perceived students often began the course with misconceptions or biased assumptions about the people served by these organizations and was concerned about negative consequences for students, organizations, and consumers if not addressed. Kennedy reached out to Gruber after receiving a flier about liaison services. The authors co-developed an information literacy session designed to help students put their service-learning experiences in the context of broader social issues, grounded in credible evidence such as Census data. The present research connects information literacy and service-learning outcomes and provides evidence that information literacy instruction is a promising intervention to support students' understanding of social issues and development of critical thinking and problem-solving skills.

Literature Review

A body of evidence suggests service-learning, widely recognized as a high-impact educational practice, enhances students' learning in many ways, both direct (retention and graduation rates) and indirect (personal and social outcomes). Meta-analyses have documented service-learning related to understanding of social issues, personal insight, and cognitive development (Yorio & Ye, 2012). Students who participate in service-learning have shown increases in cognitive skills, typically measured through either self-reported gains or faculty assessment of assignments as well as course grades (Novak et al., 2007).

Critical Thinking and Problem-Solving

Kolb (1984) found that experiential learning can improve students' critical thinking skills. In a service-learning context, critical thinking often relates to identifying and addressing social problems. Definitions of critical thinking vary, but generally include aspects related to logical reasoning, questioning, and high-level analysis. The National Council for Excellence in Critical Thinking (1987) defined critical thinking as "the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (as cited in Foundation for Critical Thinking, n.d., para. 3). Elder and Paul (2002) discussed critical thinking skills as being "able to take one's thinking apart systematically, to analyze each part, assess it for quality and then improve it" (p. 34).

However, the relationship between critical thinking and problem-solving is complex, with some scholars considering these concepts together and others measuring them separately. Ennis (1962) included 12 elements of critical thinking, one of which focused on determining if a problem was clearly identified. Paul (1993) included "identify problems" and "generate solutions" as two of many examples within the Critical Thinking Dimensions. In their discussion of assessing students' cognitive skills associated with service-learning, Steinke and Fitch (2007) combined critical thinking and problem-solving into a single category.

Many studies assessed critical thinking and problem-solving using student self-reports. For example, Astin et al. (2000) found positive effects of service-learning participation on critical thinking. Similarly, Hamon and Way (2001) found 81% of students self-reported a service-learning project improved their problem-solving skills. Hébert and Hauf (2015)

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found students reported learning gains in civic responsibility and course concepts, but this did not hold true for course grade. Steinke and Buresh (2002) argued the use of self-reports can be problematic because students may report learning gains but "objective measures have provided inconclusive support for the claim that service-learning promotes improved course material learning over alternative assignments" (p. 8).

One such objective measure is the Problem-Solving Analysis Protocol (P-SAP), a writing-based assessment tool developed by Steinke and Fitch (2003) to examine students' critical thinking/problem-solving skills. In a small sample (n = 17) the majority of students showed significant gains in critical thinking skills via the P-SAP (Campbell & Oswald, 2018). Other studies using objective measurement found service-learning was related to higher scores on exams (Ryan, 2017) and the California Critical Thinking Skills Test (Hall & Morris-Compton, 2018).

Information Literacy, Critical Thinking, and Service-Learning

There is a body of work relating critical thinking and information literacy, primarily from a theoretical perspective, with a common conclusion that definitions of the two concepts are complex and related (Albitz, 2007; Breivik, 2005; Bryan, 2014; Weiner, 2011). Kranich (2010) described librarians' role helping students "learn how to identify, evaluate, and utilize information essential for the critical thinking necessary to make choices essential to a self-governing society" (p. 2). While the *Framework for Information Literacy for Higher Education* is not explicit about critical thinking, it is built on metaliteracies which require "an ongoing adaptation to emerging technologies and an understanding of the critical thinking and reflection required to engage in these spaces as producers, collaborators, and distributors" (Association of College and Research Libraries [ACRL], 2015, p. 9). While the *Framework* does not specifically mention problem-solving, there are some logical connections, particularly in the "Research as Inquiry" frame. Inquiry is described as "a process that focuses on problems or questions [...] that are open or unresolved" and a process that "extends beyond the academic world to the community at large" which "may focus upon personal, professional, or societal needs" (p. 7).

There is a lack of research related to information literacy and related skills/outcomes in service-learning courses. To date, the research related to information literacy and service-learning is case-study focused, in contrast to quantitative examination of outcomes such as critical thinking or problem-solving. In 2003, Riddle identified "a research void abutting

these two areas of higher education scholarship [service-learning and information literacy], each pursuing separate paths of pedagogical justification, virtually oblivious to the other" (p. 71). Yet as recently as 2017, Barry et al. found 46% of surveyed librarians had no experience or interest in service-learning, and others concluded, "only recently has service learning begun to garner notice in the library community" (Rowland & Knapp, 2015, p. 71). The ACRL *2019 Environmental Scan* indicated librarians are "experimenting" with service-learning (ACRL Research Planning and Review Committee, p. 10).

Nutefall (2016) provided the first collection of case studies of academic libraries and service-learning. Barry (2011) incorporated service-learning in a credit-bearing information literacy course, concluding the course empowered students to help meet community partner needs. However, student learning outcomes were measured via the now-sunsetted *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Janke et al. (2012) described a service-learning project designed to teach information literacy skills in an undergraduate nursing research course. They found nursing faculty-librarian collaboration enhanced students' skills, but reporting was in terms of instructor perspective rather than providing explicit student learning data.

While these are part of an increasing number of examples of information literacy instruction in service-learning courses (Nutefall, 2016), often library involvement is overlooked when developing such courses or projects (Gruber, 2018). Many previous studies of service-learning courses fail to address library involvement, even if research assignments are a form of assessment. Students are often asked to conduct research, but it appears uncommon for faculty to intentionally design assignments in collaboration with a librarian; none of the articles reviewed reported on faculty satisfaction with student performance on research assignments (Long et al., 2018; Rooks & Holliman, 2018; Sedlak et al., 2003). Source quality expectations may be even more complicated because service-learning projects often require use of non-scholarly sources (Stark, 2016).

Current Study

To the researchers' knowledge, no empirical research published to date explores the role of information literacy instruction on undergraduate students' critical thinking and problem-solving within service-learning courses. While research shows strong support for the efficacy of service-learning, study designs (e.g., self-reporting, case-studies) have not

allowed for drawing clear links between specific course components and student outcomes. Information literacy is most often absent from this research.

The present study centers on the inclusion of an information literacy component, via a faculty/librarian partnership, and the implications for cognitive outcomes in a family services course. Thus, the findings address a significant gap in the literature concerning the intersection of library science and service-learning in higher education (Barry et al., 2017; Riddle, 2003; Rowland & Knapp, 2015). In addition, this study addresses some methodological limitations of previous studies and adds to a small body of literature, with discrepant findings, by using standardized assessments to examine student outcomes.

The purpose of this research was to explore the effectiveness of information literacy instruction in increasing students' ability to accurately analyze a social problem and offer solutions. Aligning with others (Paul, 1993; Steinke & Fitch, 2007), the present study considered critical thinking and problem-solving as an aggregate skill set. The first research question asked, *how does student understanding of social problems change following an information literacy session?* The authors hypothesized that students would demonstrate increased problem-solving skills regarding social issues following the intervention. The second research question asked, *are students' problem-solving skills related to, and predictive of, performance in the course?*

Methodology

Course Context

The study was IRB-approved (#19-0005) and participants completed an informed consent form. Participants received no compensation. The course instructor was a primary investigator (PI), as was the librarian leading the information literacy sessions. The course, *Strategies and Issues in Family Services*, is a sophomore-level course required for the major. It introduces students to the family studies discipline and human service profession. Students each select an organization providing community services (e.g., food/housing assistance). Throughout the semester, each contributes thirty hours of service to the community partner. In addition, course activities and assessments require direct application of course content to the volunteer experience. For the current project, an information literacy session and related assessments were added to the course.

Information Literacy Context

There is a robust information literacy program on the campus. Library faculty are engaged in campus-wide curricular decision making and faculty professional development offerings, both of which support information literacy integration within the curriculum in the general education curriculum and the majors. Formal information literacy instruction is not required for all students; thus, it primarily occurs through one-shot sessions but also with some sustained partnerships and embedded librarian collaborations with teaching faculty. Study participants may have had some previous exposure to information literacy instruction (e.g., through a first-year rhetoric course), but this course was likely their first introduction to information literacy instruction specific to a service-learning context.

Participants

All participants were undergraduate students at a Midwestern university enrolled in a family studies service-learning course offered during the fall and spring semesters. Initial course enrollment was 73 students; 14 were excluded due to course withdrawal, failing to complete measures, or non-consent, resulting in a total sample of 59 participants. Participants ranged in age from 19 to 24, with a mean age of 20.39 ($SD = .88$). The majority were juniors ($n = 32$); followed by sophomores ($n = 13$) and seniors ($n = 11$). The majority identified as White ($n = 47$), followed by Black/African American ($n = 4$), Asian-Indian ($n = 1$), and multi-racial ($n = 1$). Almost all identified as female ($n = 54$). Preliminary analyses indicated no significant difference between participants in the fall and spring semesters for age, and they were similar in other characteristics.

Materials

One information literacy session was conducted each semester in the university library. Prior to the session, the librarian created a course research guide (http://guides.lib.uni.edu/StrategiesFSKennedy). This guide was linked to the course's learning management system (LMS) page and available the entire semester. Prior to the session, students were divided into small groups based on the topical focus of their service-learning project. For example, students partnering with organizations addressing food insecurity were grouped.

The librarian initiated the session with a brief discussion of research as more than research papers, with a focus on asking and answering questions and learning more about one's

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community. She then introduced students to advanced Google strategies, such as limiting to .gov sites for finding relevant statistics. She also discussed credibility by providing examples of flawed government data and encouraged students to maintain an open mind as they approach the information they encounter, in keeping with the "Authority Is Constructed and Contextual" frame (ACRL, 2015). Each group was then tasked with using search strategies, as well as the suggested research sources provided in the course guide, to answer questions specific to their topic. All groups needed to address the presence (or absence) of representation in the data, as well as three specific questions based on a "Head, Heart, Hands" reflection prompt (i.e., thinking, feeling, action; E. Shields, personal communication, May 15, 2017).

The session addressed several components from the ACRL *Framework*. Specifically, the session activities focused on issues of information power and privilege as well as strategic exploration of information in many forms, with an emphasis on freely-available (i.e., government and non-profit) data. Students learned about the "Information Has Value" frame as they grappled with "how and why some individuals or groups of individuals may be underrepresented or systematically marginalized within the systems that produce and disseminate information" (ACRL, 2015, p. 6). As mentioned, students explored the "Research as Inquiry" frame while considering information sources to help them understand societal problems.

The Problem-Solving Analysis Protocol, developed by Steinke and Fitch (2003; 2013), was used in the study. Designed to measure students' ability to analyze causes, consequences, and solutions to a problem, it consists of an issue-based statement followed by four questions. The P-SAP was administered three times and incorporated as an assignment in the course. Students were specifically instructed they would earn ten points for simply submitting all three P-SAPs. P-SAP statements were selected for each student to match their community placement. For topics not yet represented by the P-SAP, the librarian consulted with the instrument author to develop new statements (see Appendix A). The four questions students answered, regardless of issue statement, were:

- In what way(s) might this be a problem?
- What are some possible causes of this problem?
- What could be done to try to solve this problem?
- What are the strengths and limitations of these possible solutions to this problem?

The P-SAP Global Coding Rubric (version 2013) contains two scales: locus and complexity of problem-solving. The rubric provides several examples of student responses and how each should be scored. The locus scale ranges from 0 to 6. A score of 0 reflects responses failing to identify problems or solutions related to the social issue (e.g., "not really sure"), whereas a score of 6 reflects statements identifying both individual and systemic factors as well as causal connections in understanding the social problem. For example, the rubric gives the following student response as one that would score a 6: "students should be given freedom because they're more likely to want to learn, but the balance is difficult to find because some students will take the freedom to an extreme if given no responsibility" (Steinke & Fitch, 2013, p. 1). The complexity scale ranges from 0 to 3 and examines the number of factors responsible for the social problem. For example, responses coded with a 2 either expanded on a single cause/consequence or identified at least two different factors but with minimal explanation. The two scales are combined for a summary score. Fitch and Steinke (2013) found that the P-SAP demonstrated construct validity as a measure of intellectual development.

A written reflection was assigned, tasking students with providing relevant information regarding the population served by their organization as well as comparing the macro- and micro-level information on the population. This assignment was graded by the instructor using a rubric focused on the level of evidence provided to support responses/assertions. There was a maximum value of ten points, with 290 total possible points in the course.

Procedures

This project used a within-subjects, non-experimental design. Students were required to submit their P-SAP responses in a typed document and were given the P-SAP issue statement the week prior to the due date. P-SAP #1 (pre-test) was administered the week immediately preceding the information literacy session. The library session was conducted, and the guided written reflection was due at the end of the same week. P-SAP #2 (post-test) was administered two weeks after the session, with time allotted to minimize recall of earlier responses. P-SAP #3 (delayed post-test) was completed around week 13. See Appendix B for details of data collection. P-SAPs were scored after final grades had been entered for all students each semester. The PIs conducted a practice round of coding prior to scoring participant P-SAPs. P-SAPs were individually coded by each PI, followed by a meeting to discuss P-SAP score differences and reconcile to a single score. A database was

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prepared, and quantitative analyses were initiated using the Statistical Program for the Social Sciences (SPSS) version 24.

Results

This research sought to explore the effectiveness of information literacy instruction on student problem-solving skills in a service-learning course. In order to select the appropriate statistical procedures, the researchers first needed to examine the data set for assumptions because violations of assumptions can invalidate results. Preliminary analyses determined the variables were linearly related and a Pearson's product-moment correlation assessed the relationship between study variables. There was a statistically significant positive relationship among all three P-SAP measures as well as between the written reflection and course GPA. Refer to Table 1 for correlations and descriptive statistics of the measures.

Table 1: Means, Standard Deviations, and Correlations for Measures (n = 59)

Measure	M	SD	Range	1	2	3	4	5
1. P-SAP 1[a]	3.77	1.34	0-7	--	0.41**	0.47**	0.09	0.11
2. P-SAP 2[b]	5.48	2.07	2-9	0.41**	--	0.52**	0.21	0.18
3. P-SAP 3[b]	5.32	2.48	0-9	0.47**	0.52**	--	0.21	0.11
4. Reflection	0.74	0.22	0-1.0	0.09	0.21	0.21	--	0.58**
5. GPA	0.85	0.08	0.53-1.07	0.11	0.18	0.11	0.58**	--

Note. GPA = Final percent grade in the course.
[a] n = 57 [b] n = 58
**p < .01.

The research hypothesis was supported; students demonstrated increased problem-solving skills regarding social issues following the information literacy intervention. Preliminary analysis found no significant outliers in the data nor violations of any statistical assumptions

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of a one-way repeated measures analysis of variance (ANOVA). The ANOVA revealed the information literacy session elicited statistically significant changes in P-SAP scores over time, $F(2, 108) = 22.11$, $p < .001$, partial $\eta^2 = .29$. P-SAP scores increased from pre-test ($M = 3.76$, $SD = 1.36$) to post-test ($M = 5.49$, $SD = 2.05$) and delayed post-test ($M = 5.29$, $SD = 2.51$). Post hoc analysis with a Bonferroni adjustment revealed that P-SAP scores significantly increased from pre-test to post-test ($M = 1.72$, 95% CI [1.07, 2.37], $p < .001$), and from pre-test to delayed post-test ($M = 1.52$, 95% CI [0.78, 2.26], $p = .001$), but not from post-test to delayed post-test ($M = -0.20$, 95% CI [-0.91, 0.51], $p = 1.0$).

Lastly, the second research question asked, *are students' problem-solving skills related to, and predictive of, performance in the course?* A linear regression examined the effect of P-SAP 2 (post-test) on written reflection. Preliminary analyses found no violations of any statistical assumptions. Three participants were outliers and were removed; they did not submit a reflection. The prediction equation was: reflection grade = 0.664 + 0.022* post-test. Average post-test score significantly predicted reflection grade, $F(1, 53) = 6.34$, $p = .015$, accounting for 10.7% of the variation in reflection grade with adjusted $R^2 = 9.0\%$, a small effect size according to Cohen (1988). Every one-point increase in the post-test led to a 0.022, 95% CI [0.004, 0.039] increase in reflection grade.

A linear regression examined the effect of P-SAP 2 (post-test) on final course grade. One participant was an outlier and removed from the analyses. While it approached statistical significance, average post-test score did not significantly predict GPA, $R^2 = 0.05$, $F(1, 55) = 3.39$, $p = .071$, = 0.008, 95% CI [-0.001, 0.017].

Discussion

The study's hypothesis was supported given the statistically significant improvement in student scores from P-SAP 1 (pre-test) to P-SAP 2 (post-test). These findings add much-needed empirical evidence to prior theoretical and case-study documentation of the relationship between information literacy and critical thinking (Bryan, 2014; Nutefall, 2016), in addition to establishing the important role of information literacy in the context of a service-learning course.

Research has indicated support for service-learning's positive impact on outcomes such as problem-solving and critical thinking (Astin et al., 2000; Eyler et al., 2001). The literature has also indicated that reflection is a key component to effective service-learning and

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promoting student learning (Steinke et al., 2002), including particular elements such as instructor feedback or students perceiving connections to course content (Gray et al. 1998; Greene & Diehm, 1995). The quality of reflection is likely a key factor in promoting cognitive gains. If students lack skills to productively reflect, gains may be stifled (Dunkin & Forgette, 2014). Two recent meta-analyses were unable to parse out the role of reflection (see Celio et al., 2011; Conway et al., 2009). While reflection showed the greatest effect on certain outcomes, analyses examining the moderation of reflection on academic outcomes could not be conducted due to too few studies (Conway et al., 2009).

The results from the current study begin to fill this gap and highlight the importance of assisting students with developing knowledge and skills for more productive reflection. Prior to the information literacy session, students performed below the 50th percentile on the P-SAP. However, after the session, there was a statistically significant improvement, and their average scores were above the 50th percentile. Analyses also found students' problem-solving skills predicted course performance (i.e., written reflection grade). Students who demonstrated less advanced problem-solving skills performed significantly worse on their written reflection, highlighting the relationship among reflection, content knowledge, and problem-solving skills.

Early literature reviews noted an inconsistency in results examining the influence of service-learning on cognitive outcomes reflected by student performance (Eyler et al., 2001). More recent meta-analyses found a significant and positive relationship between service-learning courses and student performance (Celio et al., 2011; Conway et al., 2009). However, the included studies measured performance in various ways (e.g., test grades, course grades, motivation) and singular designs have demonstrated the complexity of assessing cognitive outcomes based on performance. For example, Hébert and Hauf (2015) found students in service-learning courses performed significantly better on course content but did not differ from non-service-learning students in final course grades. Methodological limitations have added to the complexity of identifying clear links with cognitive outcomes. For example, Hébert and Hauf (2015) had only twenty-three service-learning students, similar to other studies (Hudson, 1996; Miller, 1997). Scholars have also argued that final grades may not be an accurate measurement of the complex thinking targeted by service-learning and have suggested using critical thinking/problem-solving protocols (Hébert & Hauf, 2015; Steinke & Fitch, 2003).

The results provide new insight into implications for cognitive outcomes in service-learning courses using a written problem-solving protocol. While there was a significant and positive association between students' problem-solving and content knowledge, the positive association with final course grade was not statistically significant. However, it approached statistical significance, which suggests the possibility for a predictive relationship between higher order thinking and performance in a service-learning course. While the sample size was larger than many previous studies, it may have limited findings.

Finally, service-learning has been found to reduce students' stereotypes (Eyler et al., 2001) and increase their cultural competence (Kilgo et al., 2015). At the same time, many students enter service-learning courses holding stereotypes and bias toward the intended audience (Skobba & Bruin, 2016). One reason for implementing information literacy instruction was to increase students' awareness of the complexity of social issues often faced by the individuals and families served in local organizations, implicitly reducing students' bias. The results of the study reflect increased awareness and may serve as a proxy for decreased misconception and bias. The significant increase in students' problem-solving following information literacy instruction demonstrated advancements in thinking from a more individualistic explanation of the problem (e.g., blaming the victim) toward identifying the systemic/structural roots of social problems. For example, prior to the library intervention, a student with the topic of food insecurity responded, "Possible causes of this problem could be that families spend money on unnecessary items." Following the library intervention, student responses evolved and were evidenced by statements such as, "Some possible causes of this problem is the increasing costs of medications, rent, and food. As each individual category increases, it makes it difficult for individuals to get all of their needs."

Limitations

Limitations include a modest sample size, due to only one course being taught per semester; data collection over two semesters helped in this regard. As part of the scoring process, the researchers recognized that a few students may not have understood the P-SAP prompt assigned to them; therefore, some scores may reflect this misinterpretation rather than critical thinking skills. In addition, response fatigue, a concern shared by others administering the P-SAP (Campbell & Oswald, 2018), may have been a factor. Students were asked to complete the same P-SAP three times and were awarded a relatively small percentage of course points for completing the task (as opposed to assessing its quality).

Conclusion

The results of this study highlight the importance of information literacy instruction in helping students improve cognitive outcomes by investigating issues and addressing misconceptions through high-quality sources. Additionally, it identified an empirical link between critical thinking and performance outcomes in a service-learning course. In assessing student outcomes, it is imperative that future research decrease reliance on student self-reports; cited to represent more than 80% of studies in one meta-analysis (Celio et al., 2011). This study provides one model for assessing cognitive outcomes in service-learning courses. The process of using two experts with differing perspectives to rate and reconcile P-SAP scores may provide more accurate evaluation.

Further, the findings emphasize the need for future research to explore the effects of the mediation/moderation of the service-learning factors long associated with student outcomes, a need identified by others (Celio et al., 2011). In addition, further development of the P-SAP, such as additional prompts and determination of an optimal test-retest design, would be advantageous.

Finally, faculty should consider intentionally incorporating information literacy instruction to help students more effectively engage in and benefit from service-learning courses. Specifically, faculty could collaborate with librarians in designing research assignments and scaffolding information literacy instruction appropriately within courses and programs that emphasize service-learning. Academic librarians should consider their existing services related to service-learning and community engagement, especially in light of these areas' growth as institutional priorities and the continuing movement to demonstrate the value of academic libraries as it relates to student success.

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https://pdxscholar.library.pdx.edu/comminfolit/vol14/iss2/3
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Appendix A: P-SAP Prompts

The following new Problem-Solving Analysis Protocol (P-SAP) prompts were developed in collaboration with Dr. Peggy Fitch, with exceptions marked with *. Several other prompts used are part of the P-SAP Questions and Issues documentation, available from https://departments.central.edu/psychology/faculty/psap/

Issue statement for P-SAP protocol
Mental health needs are complex and multi-faceted, making them difficult to solve.*
Young people need support for having healthy spiritual lives.*
College students need support for exploring healthy views of gender and sexuality.*
Healthcare needs are complex and multi-faceted, making them difficult to solve.
Young people need to learn financial literacy skills in order to become successful adults.
Children grieve in unique ways and often need both short- and long-term support for managing grief.
Service animals may assist many individuals with special needs or mental illness but aren't accessible to everyone who might need them.
Some families with low economic status have to choose between costly healthy/fresh food and paying for health care or rent.
As baby boomers age, there are increasing needs of the elderly.
At-risk youth need positive role models to develop into successful adults.
Animals have no way of standing up for their own rights.
Many pregnant individuals are lacking in the basic services they need for a healthy pregnancy.
Child abuse is difficult to prevent due to the complexity of factors that contribute to it.
Many young children don't have the positive learning environments they need to develop properly.
People with disabilities often experience the illness of stigma.
Domestic violence is difficult to prevent due to the complexity of factors that contribute to it.
Homelessness is difficult to prevent due to the complexity of factors that contribute to it.
Many veterans need extra services to be successful in society.
Many refugees need extra services to successfully transition to the U.S.
Scientific advances have increased the number of medically-fragile premature infants who survive.
Poverty is a problem that often goes unnoticed in our local community.

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Appendix B: Information Literacy Protocol

Timing	Assessment	Details/Instructions
Week 4	P-SAP#1 Assigned	Students were provided their individualized P-SAP. They were instructed to answer the prompts to the best of their knowledge and were only graded on having completed the assignment. Other than typing their P-SAP responses, students were told that there were no other requirements/expectations (e.g., citing academic sources).
Week 5	P-SAP #1 Due	Student brought a print copy of their completed P-SAP responses to the next class, which was the information literacy session.
	Information Literacy Session	Information literacy session conducted by PIs
	Written Reflection Due	This assignment was due at the end of the week, following the information literacy session. Students were instructed to use the knowledge gained in the session to provide data about the population being served by their selected service-learning organization.
Week 6	P-SAP#2: Assigned	Students were provided their individualized P-SAP. They were given the same instructions as P-SAP #1, with the addition of information concerning self-plagiarism and instructed that their responses must consist of new written material.
Week 7	P-SAP#2 Due	Student brought a print copy of their completed P-SAP responses to class.
Week 12	P-SAP#3: Assigned	Students were provided their individualized P-SAP and the same instructions as outlined for P-SAP #2.
Week 13	P-SAP#3 Due	Student brought a print copy of their completed P-SAP responses to class.
Week 15	Informed consent & demographic data	Students were provided with instructions for completing the informed consent and demographic data forms for study participation.

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