Outcomes of Service Learning Experiences as Predictors of Critical Thinking Skills

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Author's Note

ABSTRACT. Service learning courses provide opportunities for students to experience human services work in the field and apply it to curricula. Learning objectives often pair experiences in the field with gaining knowledge and improving academic skills. The present study examined a model of critical thinking development from service learning that combines professional and community perspectives (Sedlak, Doheny, Panthofer, & Anaya, 2003). In a sample of 182 students at one university, a hierarchical multiple regression analysis found that service learning outcome variables had some influence on critical thinking skills after controlling for demographic and academic variables, as the model predicted. Implications of the findings support the role of service learning as a core pedagogy in family science and human services curricula.

Keywords: Service learning, critical thinking, family science, human services education

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Service learning is a form of experiential learning that adds another stakeholder to the traditional student-faculty dyad: the community (Eyler, Giles, Stenson, & Gray, 2001). In doing so, service learning changes the educational experience for faculty and students. It brings current, real-world situations into the classroom for critical analysis and individual reflection; it offers the potential for the role of the faculty to shift from solely delivering content to helping students understand their experiences in the community. Through this, students explore classroom content contextually through interaction, immersion, and community engagement (Bringle & Hatcher, 1996; Butin, 2010; Eyler & Giles, 1999).

Although much research has explored benefits of student engagement in service learning in terms of civic and social engagement (Astin, Vogelgesang, Ikeda, & Yee, 2000; Eyler & Giles, 1999; Eyler et al., 2001; Pascarella & Terenzini, 2005; Simons & Cleary, 2006), little research has focused on the relationship between service learning and students' critical thinking skills. Critical thinking and community engagement are emphasized in the purpose of higher education and service learning provides an explicit link between them in the classroom (Sapp, 2002). This article reports on an analysis of surveys completed at one institution where critical thinking skills were assessed among college students involved in service learning.

Service Learning

Several studies have demonstrated positive outcomes as a result of service learning, including civic engagement and academic outcomes (Eyler & Giles, 1999) as well as individual growth (Astin, Vogelgesang, Ikeda, & Yee, 2000). Kilgo, Ezell Sheets, and Pascarella (2015) found service learning was related to some liberal arts outcomes, specifically cultural competence and leadership, but not to critical thinking. Indeed, outcomes from service learning experiences tend to be difficult to measure quantitatively.

Theoretically, service learning emanates from Bloom's (1956) *Taxonomy of Educational Objectives* (Ash & Clayton, 2004), which suggests that learning begins with memorization of concrete terminology and concepts and then expands to more applied aspects. In family science, concrete understanding is then extrapolated to the social context of family, community, and society. Application to the field moves concepts organically from lower forms of thinking, such as identifying and describing, to higher forms of thinking such as analyzing, evaluating, and synthesizing. Educators guide students through this process using active reflection assignments to join students' experiences with course concepts to create learning. Stage models of learning and teaching in human services, such as Bertha Capen Reynolds' (1942) classic theory, use a similar progression from novice to master to explain students' initial encounters in the field. The stages are typically iterative because mistakes are likely to occur and can be fruitful learning opportunities as confidence may ebb and flow in early stages. Students gain experience paired with instruction to boost learning, while their professional presence in the field flourishes.

Fink's (2013) taxonomy of significant learning demonstrates a need for an expanded look at the student's development. This taxonomy includes foundational knowledge, application,

integration, caring, human dimension, and learning how to learn. This expansion accommodates the broader need for personal and professional development into the process of learning in higher education. Service learning broaches the interlude of learning dimensions, as Fink highlights, and provides context for significant learning (Barnes & Caprino, 2016). Typically, service learning courses are designed to give students with minimal experience in the field the opportunity for guided instruction (Molee, Henry, Sessa, & McKinney-Prupis, 2010). Internships and other more intensive field experiences encourage further professional growth and opportunities to understand more complex concepts in real time. Within the context of experiential learning theories, students learn better by doing and thinking about what they have done, which is often called reflection (Kolb, 1984). Students are more engaged when they are participants, not recipients (Freire, 1970). A key strategy for service learning is linking field experience with course content using reflective exercises tied to learning objectives that demonstrate critical thinking (Kolb, 1984; Kraft, 2000; Sanders, Van Oss, & McGeary, 2016).

Service learning is often emphasized in family science and human service education (Bannerjee & Hausafus, 2007; Hamon & Way, 2001; Jacobson, Oravecz, Falk, & Osteen, 2011; Nicholas, Baker-Sennett, McClanahan, & Harwood, 2011; Pollard & McClam, 2014; Toews & Cerny, 2006). The need to engage with populations and issues of interest outside the classroom is essential to socialization and development of a professional identity during the education process (Belous, Topor, & Gorton, 2013; Miller, 2013; Toews & Cerny, 2006). Through experiential learning, students are immersed in the context of constructs they have studied and confronted with the need to strategize, using theories and methods for multi-level systems they have acquired through education (Hamon & Way, 2001; Hogan & Bailey, 2010). Students also tend to reflect positively on experiential learning, which may contribute to increased retention of students in the discipline (Cheek, 2013; Newman & Hernandez, 2011). When instructors struggle to challenge students to separate themselves from their personal experiences and apply concepts analytically, the process of creating such critical awareness can be guided by using students' initial entries into the field (Hogan & Bailey, 2010; Molee et al., 2010). Service learning provides a venue for organic learning in the family science discipline.

Critical Thinking

The term *critical thinking* has often been used as an umbrella reference to higher level thinking strategies such as analysis, synthesis, reasoning, and problem-solving, inferring that characteristics such as being inquisitive, creative, and reflective create a quality of learning that higher education can impact (Facione, Sánchez, Facione, & Gainen, 1995; Elder & Paul, 2007). Critical thinking is often used in higher education outcomes; historically, the term has been rooted in questioning assumptions and challenging pre-conceived notions. While much of the conceptualization has been associated with learning theorists like Dewey, further discussion incorporates critical theorists such as Marx and the critical pedagogy of Freire (1970) and Brookfield (2012) (Paul, Elder, & Bartell, 1997). From this perspective, critical thinking is intrinsically tied to social justice. A goal in family science and human services education is to broaden awareness of oppression and target interventions for marginalized populations to impact social capital. Therefore, experiential activities can illustrate social justice issues and students

can engage in action-oriented, empowering analysis and response (Salas, Sen, & Segal, 2010; Saleebey & Scanlon, 2005).

Although critical thinking has broad appeal and application, measures of critical thinking have focused on a narrower definition. Critical thinking measures often focus on determining logical reasoning ability through a set of questions with multiple choice responses. Many of these measures have been standardized to provide tools for assessing college learning outcomes. There is debate over whether there is a set of critical thinking skills impacted by higher education in continuity of the experience, or whether critical thinking skills are discipline-specific, where social science disciplines would have a different variant of critical thinking outcomes than mathematics would, for instance (Benjamin, 2014). Surveys of critical thinking experts and college faculty have found agreement that critical thinking skills are important, are likely to change as a result of education, and therefore should be monitored to demonstrate the value of higher education (Facione, 1990).

Service Learning and Critical Thinking

Increasing critical thinking is often a goal for service learning experiences; however, previous research has used various methods to determine whether the goal has been achieved. Several studies interviewed students in the examination of critical thinking skills gained as a result of service learning (Borron, Loizzo, & Gee, 2015; Phillips & Bond, 2004; Sedlak, Doheny, Panthofer, & Anaya, 2003). Empirical studies of critical thinking in service learning have produced mixed results (Cress, 2003; Heinrich, Habron, Johnson, & Goralnik, 2015; Joseph, Stone, Grantham, Harmancioglu, & Ibrahim, 2007; Molee, Henry, Sessa, & McKinney-Prupis, 2010; Nokes, Nickitas, Keida, & Neville, 2005). Operationalization of critical thinking is part of the reason for mixed results. Varieties of critical thinking measurement have ranged from a one-item response on critical thinking in a survey (Cress, 2003) to improvements in analysis, synthesis, evaluation, and application (Joseph et al., 2007) and content analysis of submitted student work (Heinrich et al., 2015). Molee et al. (2010) adapted a model that included "integration, relevance, accuracy, clarity, depth, breadth, logic, and significance" (see Ash, Clayton, & Atkinson, 2005, Appendix B, p. 60) to anchor reflection on service learning experience in critical thinking theory. Nokes et al. (2005) used the California Critical Thinking Disposition Inventory, a standardized scale, to measure critical thinking change in a sample of nursing students enrolled in a service learning course. The scale measures truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, and inquisitiveness (Facione, Facione, & Sánchez, 1994). According to Nokes et al. (2005), students' scores for overall critical thinking and self-confidence decreased significantly after a service learning experience when compared to their previous scores. This finding contradicted the Nokes et al. hypothesis; however, researchers suggested that novice students may recognize their limited ability after exposure to practice in the field.

Given the wide variety of ways to operationalize critical thinking, it seemed prudent to select a critical thinking model that reflects the philosophical framework of Dewey and principles of service learning. One such model is based on reflection of ideas, decisions, and behaviors. According to the model, service learning experience improves "Professional Self-

Perspective" and "Community Perspective" and contributes to a "Critical Thinking Perspective." Through qualitative research with beginning Baccalaureate nursing students, Sedlak and colleagues (2003) identified the concepts of "caring for others" and "improving communities" as indicators of professional self-perspective. The community perspective was composed of "promoting health" and "awareness of diversity." This study examines students who are receiving their education in the family and human services major; therefore, indicators of professional self-perspective and community perspective will be changed slightly to concepts in family science and human services, service learning outcomes (Jacobson et al., 2011).

Sedlak et al. (2003) critical thinking perspective model
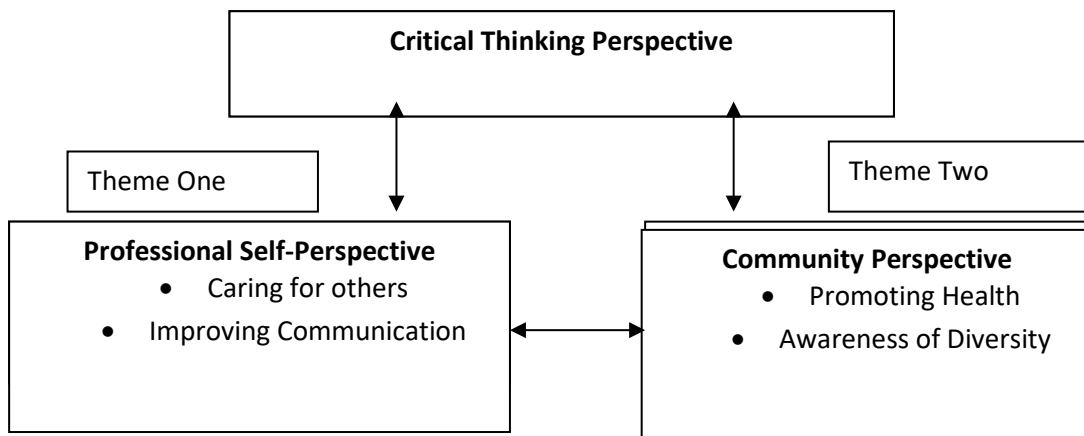
Adapted model
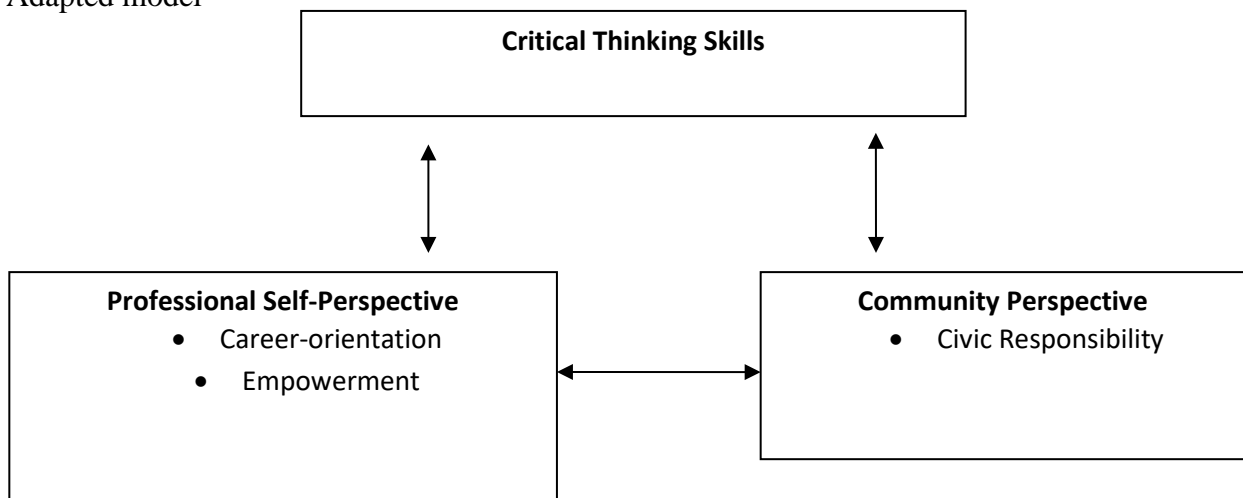
Figure 1. Sedlak et al. (2003) critical thinking perspective model developed from qualitative interviews with nursing students and the adapted model used to examine predictors of critical thinking skills in human services students. Reprinted by permission of the publisher.

In the present study, indicators of professional self-perspective will reflect the experiences of students in the family and human services major with the concepts of career-orientation and empowerment. The concept of career-orientation relates to students' desires to continue to work in human services positions like those that composed their service learning site. Empowerment is an overarching goal for human service professionals, much like caring for others is for nurses, it is important for students to experience empowerment themselves before working to empower others (Gutiérrez, 1995). "Empowerment refers to the process by which individuals and groups gain power, access to resources, and control over their own lives" (Robbins, Chatterjee, & Canda., 1998, p. 121). The concept of civic responsibility will be used as an indicator of community perspective. An increase in civic responsibility, a commitment to investing in and improving communities, has been found to be an outcome of service learning (Eyler & Giles, 1999). Although awareness of diversity was included in the "community perspective" of the Sedlak et al. (2003), it has not been included in previously measured outcomes of service learning using The Higher Education Service Learning Survey (Diaz-Gallegos, Furco, & Yamada, 1999; Jaboson et al., 2011). Due to the lack of a comparable subscale to support an operational definition of 'awareness of diversity', the concept was not measured in this analysis. As the concepts related to the experience of service learning, specifically career-orientation, empowerment, and civic responsibility, increase, it is expected that critical thinking skills will also improve (See Figure 1 for a representation of the conceptual model). The proposed study will test the hypothesis that more service learning hours and more civic responsibility, career-orientation, and empowerment predict higher critical thinking scores in family and human services majors.

Methods

Participants

Permission from the university Institutional Review Board was granted prior to beginning research activity. At the end of the Spring 2009 semester, and the beginning of the Spring 2010 and Fall 2010 semesters, students enrolled in various family and human services courses at a large mid-Atlantic university were administered surveys during class time. Researchers obtained informed consent from students then removed their names from coded surveys. Participant information was kept confidential and separate from the data. After providing information about the survey, students were informed that their participation was voluntary, they would not receive any course credit or other incentive, and they could stop at any time. Students were given 55 minutes to complete the surveys, as the critical thinking measure was a timed procedure. Only one assessment per student was obtained over the course of the three semesters. If students took the assessment more than once, their first assessment was used for this analysis.

Of the 166 students who provided information used in the analysis, 95.8% ($n = 159$) were female and 3.8% ($n = 7$) were male. There were 75.9% ($n = 126$) of students who identified as white and 24.1% of students of color ($n = 40$). Ages of students ranged from 19 to 44 with an average age of 21.74 ($SD = 2.5$). Demographics in the sample reflected the demographics of students enrolled in the major. Additionally, students' GPA's ranged from 1.9 to 4.0 with an average of 3.16 ($SD = .40$). There were 4% (n = 6) sophomores, 28% (n = 47) juniors, 68% (n =

113) seniors, none of the respondents were freshmen. Participants had a range of service learning hours from 0 up to 450 hours with an average of 68.8 hours ($SD = 96.9$).

Measures

Participants were administered The Higher Education Service Learning Survey (Diaz-Gallegos et al., 1999), a self-report measure with four subscales including civic responsibility, academic, career, and empowerment, concepts that have been found to be consistent with the service learning experience. The Higher Education Service-Learning Questionnaire (HESLQ) is a 29-item scale with Likert type rating system from 1 (strongly disagree) to 4 (strongly agree) and reversed items. Civic responsibility questions ask students about the importance of providing services in the community (Cronbach's $\acute{\alpha} = 0.75$). Academic questions target students' interest in coursework (Cronbach's $\acute{\alpha} = 0.72$). Career questions ask students to reflect on their preparation for a career (Cronbach's $\acute{\alpha} = 0.66$). Empowerment questions tap into students' sense of self-efficacy and sense of control over their environments (Cronbach's $\acute{\alpha} = 0.52$). While a couple of subscales are below Cronbach's alpha of 0.7, it is understood that subscales with a Cronbach's alpha lower than 0.7 should be interpreted with caution; however, it is not uncommon in research on outcomes related to service learning to have subscales below 0.7 (see Nokes, Nickitas, Keida, & Neville, 2005; Sessa, Natale, London, & Hopkins, 2010). Furthermore, low alpha scores could be the result of other factors including too few questions, little interrelatedness of items, or no homogeneity among subscale constructs (Tavakol & Dennick, 2011, p. 54). In this measure, the career subscale had six items: the empowerment subscale had five items. Within the career subscale, items referenced plans, daily responsibilities, personal qualities, and skills. Despite the subscale scores, these scales demonstrated internal consistency in the present study and similar findings as reported by Diaz-Gallegos et al. (1999). Previous research using the HESLQ scale with family studies students found that it measured the concepts reliably and measured positive changes in academic and career variables after a service learning experience (Jacobson et al., 2011).

Critical thinking was measured using the California Critical Thinking Skills Test (CCTST) to assess students' overall critical thinking skills (Facione, Facione, Blohm, Howard, & Giancarlo, 1998). This standardized test operationalizes critical thinking based on the definition in a Delphi study the American Philosophical Association conducted: "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (Facione, 1990, p. 2). The CCTST is a standardized measure composed of 34 multiple choice items of critical thought questions that increase in difficulty. Bringle, Phillips, and Hudson (2004) identified the CCTST as a measure of critical thinking that would be pertinent to the study of critical thinking in service learning experiences. Completed measures were sent to Insight Assessment for analysis.

Results

A hierarchical multiple regression analysis was performed to test the hypothesis. Items on scales were reversed if needed and were coded so that higher scores reflected more positive responses, and then were scored. Gender was coded as female (1) and male (2) and race/ethnicity was coded to people of color (1) and white (2). Gender, age, and race/ethnicity were entered in the first step of the regression to control for demographic variables. The HESLQ academic subscale and student status were entered in the second step. Number of service learning hours experienced were added on the third step. HESLQ subscales civic responsibility, career-orientation, and empowerment were entered in the fourth and final step. Critical thinking (total CCTST score) was the outcome variable in the analysis. Assumptions of normality, linear relationship between independent and dependent variables, reliability of measurement, no multicollinearity, and homoscedasticity for the analysis were adequately met (Cohen, Cohen, West, & Aiken, 2003). Order of entry was determined by the model adapted from Sedlak et al. (2003) and previous literature (see Table 1 for scale means and Table 2 for regression coefficients and statistics).

Table 1

Scale Means

Measure	M	SD
HESLQ Academic	20.15	2.41
HESLQ Civic Responsibility	36.66	10.36
HESLQ Empowerment	24.61	2.81
HESLQ Career	18.88	2.40
CCTST	14.72	4.02

Table 2

Hierarchical Multiple Regression Statistics for Predicting Critical Thinking

(Step) Predictor	B	$SE\ B$	β	t	p	Upper	Lower	R^2	Change	p
(1) Constant	12.00	4.35		2.40	0.02	19.04	1.86			
(1) Age (Years)	0.01	0.13	0.01	0.11	0.92	0.27	-0.24			
(1) Gender	-1.01	1.51	-0.05	-0.67	0.50	1.97	-3.99			
(1) Race/Ethnicity	2.05	0.75	0.21	2.72	0.01	3.54	0.56	0.07	0.07	0.01
(2) Student Status	0.12	0.25	0.04	0.49	0.62	0.61	-0.37			
(2) Academic	-0.01	0.17	-0.01	-0.05	0.96	0.32	-0.34	0.07	0.00	0.87
(3) Service Learning Hours	0.00	0.00	0.02	0.17	0.87	0.01	-0.01	0.08	0.01	0.14
(4) Civic Responsibility	0.11	0.03	0.27	3.09	0.00	0.17	0.04			
(4) Empowerment	0.06	0.14	0.05	0.46	0.65	0.34	-0.21			
(4) Career	-0.14	0.16	-0.09	-0.88	0.38	0.18	-0.47	0.14	0.06	0.02

Note: Figures from final step of model. Final model: F=2.89, p=003, R^2=.14, adjusted R^2=.09.

The model was significant (F=2.89, p=003) and accounted for 14% of the variance (adjusted R^2 = .09). The set of demographics accounted for 7.0% of the variance (F = 4.08; p = .008). After controlling for demographics, the set of academic variables was not significant, nor was the hours of service learning in the third step. Finally, after controlling for demographics, academics, and service learning hours, the set of HESLQ subscales accounted for 5.9% of the

variance ($F = 3.57$; $p = .015$). The analysis also found two significant predictors of critical thinking skills: race/ethnicity and civic responsibility. White students in the sample scored approximately 2 points higher than students of color on the critical thinking skills test. Also, for each one point increase in the civic responsibility subscale, there was a .11 increase in critical thinking scores.

Discussion

Findings support the link between service learning outcomes and critical thinking. A key outcome from service learning experience is acquiring increased *civic responsibility*, where students feel more engaged with their communities and become more interested in contributing to improving their communities (Bringle & Hatcher, 1996). According to the findings, improvements in service learning outcomes have some positive influence on critical thinking skills. Civic responsibility also seems to influence critical thinking skills, even after controlling for academic influences. Although there was some difference in critical thinking scores based on students' ethnicities, this may indicate some inherent bias in the measure of critical thinking (Banks, 2006; Miller, Harnek Hall, & Tice, 2009). The notion that different cultures shape thinking differently is plausible and these differences may influence a measure of thinking. Therefore, race/ethnicity was an important demographic to control for in the analysis. Gender was equally important; however, the sample was overwhelmingly female. It is important to consider how personal characteristics impact learning and it would be beneficial to understand the impact of a wider range of individual characteristics on the service learning experience and development of critical thinking skills. It is equally important to consider that the narrow definition of critical thinking that standardized tests offer may not be highly valued in family science and human services, where divergent forms of thinking are often required (Powers-Foltze Dirette, 2017; Samson, 2016). As education in family science and human services continues to prioritize service learning experiences, outcomes from such experiences should be examined in the context of goals for higher education.

While there is a dearth of literature containing quantitative support of civic engagement within service learning as a predictor of critical thinking skills, qualitative evidence for this finding is available (Sedlak et al., 2003). There need to be more studies to examine the relationship between service learning, civic engagement, and critical thinking in a larger sample of college students across disciplines.

Limitations

The sampling strategy was not conducted at random; therefore, the sample may not be representative of the population. Without random selection into the study, there is a possibility of systematic bias, which decreases generalizability to the population (Engel & Schutt, 2005). Although there were significant findings, the sample size was relatively small, pre-dominantly female, and from one setting, all of which should be considered in interpretation of the generalizability of results. The cross-sectional design of the study did not support the temporal precedence of the independent variable; therefore, the predictor-outcome results should be

interpreted as implied by the model and theory. There needs to be further research to build support for this relationship.

Additionally, there could have been students who changed outside the realm of the service learning experience, which is also called an endogenous change, according to Engel and Schutt (2005). In research on learning processes, it is very difficult to rule out other influences on skills such as critical thinking. However, it is of interest that the variables were related in the expected direction. Finally, it should be noted that the sample of students experienced some fatigue with the critical thinking measure. Indeed, some students were rather frustrated and reacted negatively to taking class time to complete a standardized test. Future studies should consider using incentives for completing a quantitative measure, since intrinsic motivation did not seem to sustain student initiative. Potentially, researchers should consider using other methods to measure critical thinking because many human service educators do not value results of multiple choice assessment measures for critical thinking. Such results often measure minimal gains, if any (Harnek Hall, Miller, & Tice, 2012; Samson, 2016).

Alternative explanations

Other reasons could explain the results. For example, the course content– irrespective of the service learning – may have produced the effect. In other words, if the course content was taught without the service learning component, then the students would still have produced the same effect. Therefore, the effect of critical thinking could have emanated from a research course, a writing course, or another kind of course that prompted the relationship between these two. Additionally, many students are employed at non-profit agencies or are already contributing their service in the community. As a result, students may have developed a sense of civic responsibility through these means instead of through the service learning course.

Strengths

Using the CCTST, a standardized critical thinking measure, added strength to the findings. The study of critical thinking skills has relied on analytical measures such as Watson-Glaser (Watson & Glaser, 1994) and CCTST (Facione et al., 1998). Use of a metric with known properties was important in advancing current knowledge of critical thinking skills in family science and human services students and the relationship with service learning experiences.

The Sedlak et al. (2003) model, inducted through qualitative research with nursing students, served as the basis for conceptual development of the model. The modified model helped build the hierarchical regression model and provided a framework for interpreting the findings. Grounding the study in previous empirical research helps support construct validity of the findings.

Implications

Evidence from this study would support theoretical underpinnings of service learning as determined by Sedlak et al. (2003). Findings suggest that service learning outcomes related to

professional and community perspectives are predictors of critical thinking skills (Eyler & Giles, 1999). Influencing students' critical thinking is an important aspect of pedagogy in higher education; service learning experiences seem to contribute to improved critical thinking skills. Students are – in effect – learning by doing in real time with real world situations.

While there is the benefit of increased critical thinking skills among students who participated in service learning projects, there is also a cost. Most college courses have an established amount of out-of-class time allotted for reading assigned materials, researching and writing papers, studying for exams, etc. Service learning adds another dimension to this equation by requiring hours in the field. Students now have to meet additional expectations that go above and beyond the classroom. Since many students are employed, caring for a loved one (child, sibling, or parent), or have any number of possible additional responsibilities while also taking other courses, their workloads can increase significantly.

Service learning increases workloads for faculty as well. In addition to service to the university and scholarship for the field, faculty must plan courses, prepare materials, find agencies and community partners willing to work with students, and address problems as they arise (Brown & Kinsella, 2006; Cronley, Madden, Davis, & Preble, 2014; Lucas, Sherman, & Fischer, 2013; Pollard & McClam, 2014). To justify these added costs, benefits of service learning must be established from evidence. Students tend to have positive responses to experiential learning such as service learning and internships, and report that these experiences were crucial to their education and professional development (Brown & Kinsella, 2006; Jett & Delgado-Romero, 2009; Lucas, Sherman, & Fischer, 2013). The added evidence that service learning contributes to critical thinking suggests it should continue as an integral part of the human service and family science curriculum (Hamon & Way, 2001).

Implications for measuring critical thinking in family science and human services students include further consideration of the use of standardized measures. As noted, students responded with some discomfort to the notion of taking standardized tests. Likewise, researchers were interested in measuring critical thinking accurately. However, they questioned whether a collection of logic questions with multiple choice response categories really measured the types of learning targeted in higher education for family science and human services. Certainly, instructors would like to have an impact on logical reasoning and analysis, but synthesis of disciplinary knowledge applied critically in the field may be a more direct measure of outcomes.

A recent review of service learning practices found that structured reflections, which guide students to use course knowledge applied to practice experiences for analysis, were more specific to assessing student performances in the field and exemplified outcomes of critical thinking as defined by instructors (Bringle, Reeb, Brown, & Ruiz, 2016). Use of the DEAL (*describe, examine, articulate learning*) model for critical reflection has been endorsed as a tool to develop students' critical thinking in service learning courses. The model provides a framework for structured reflection, guiding students through increasingly complex examination of their experiences. This format allows students to frame their experiences in an academic context and provides a template for impacting learning through analysis (Ash & Clayton, 2004; Ash et al., 2005; Bowen, 2010; Bringle et al., 2016). Using structured reflection has been found

to enhance service learning outcomes and is endorsed as an integral strategy for learning (Molee et al., 2010; Sanders, Van Oss, & McGeary, 2016).

Interestingly, there is some indication in the qualitative research that students experience "deeper learning" during their service learning experiences (Hemmerich, Hoepner, & Samelson, 2015). The greatest outcome of the service learning experience may not have been measured. Students and faculty report appreciation for the growth that occurs when students are immersed in the community, actively applying knowledge in real-time, then analyzing that experience using academic concepts through assignments that build awareness. This heightened awareness gleaned from students' own experiences becomes a foundation for professional development. Therefore, the service learning experience is often at the root of the professional path.

Conclusion

There was evidence that the model explains some variance in critical thinking skills. Further research should explore various predictors of critical thinking. The positive relationship between civic responsibility and critical thinking skills lends support to the contribution of service learning experiences in developing critical thinking skills.

Research should continue to determine what the role of service learning in critical thinking development and other important outcomes in higher education is. Future research should compare students who are not taking service learning courses with those who are, or use a time series design where students are assessed before service learning courses and reassessed after experiencing these courses. Continued efforts to better define outcomes from service learning experiences quantitatively is encouraged, particularly to provide feedback that could optimize learning experiences. Further discussion of assignments that demonstrate critical thinking is also encouraged. Standardized tests of critical thinking may not yield results relevant to expected outcomes, leading to questions about validity and bias. This study establishes the groundwork for a prolonged, in-depth look at how service learning contributes to development of critical thinking in undergraduate students and the long-term impact of service learning experiences. It will give investigators insight into performance of the chosen measures and the relationship between service learning and critical thinking. Research should also follow students' post-graduation to determine whether changes from service learning experiences continue in the long-term.

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