Student academic development and gains in loosely-structured service-learning projects: A tale of two sections

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Introduction

Service learning is a pedagogical approach in which students learn and reflect while taking part in a meaningful community activity (AACC 2011).

In service-learning projects that are **loosely structured**, students must determine, but are guided in the process of:

1. Problem identification and definition
2. Goals and objectives setting
3. Strategy formulation
4. Implementation

Freshman students tend to be rule-based and authority-driven as they transition from dependency to self-direction, while upper-level students tend construct knowledge reflectively and critically (Perry 1970). **I investigated how student success and approaches to tasks differed in sections of upper-level and freshman students.**

The context was two sections of BIO141: Plants and People, a non-majors general education course.

Section	Service project	Living-Learning Community
Freshman	Helping Friends of Red Cedar State Trail with invasive plant species problem	Yes
Upper-level	Helping community-supported agriculture operation	No

Methods

Project goals included:

- Deeper understanding of invasive plant species or sustainable agriculture course content.
- Meaningful aid to community partner.
- Student development as creative problem-solvers.

I taught students creative problem-solving strategies by emphasizing a combination of divergent and convergent thinking (DeHaan 2009), and creating an open, safe environment (Bull et al. 1995). Students were given feedback at each stage of the process.

I assessed student gains and problem-solving strategies using surveys and performance rubrics that encouraged creativity and risk-taking. For example, the risk-taking rubric:

Topic	Poor	Novice	Apprentice	Expert
Risk-taking	Stays within the minimum requirements for the project	Considers new directions & approaches	Incorporates new directions & approaches into final product	Actively seeks out and applies untested solutions

Results

1. Upper-level students were more successful in the project and the course in general (Table 1).

Table 1. Mean (SE) student performance statistics compared with a two-tailed t-test.

Performance aspect	Freshman	Upper-level	p-value
Overall project grade	28.0 (2.7)	33.5 (1.7)	0.129
Project risk-taking score	3.3 (0.4)	4.7 (0.2)	0.025
Overall course grade	82.2 (1.6)	90.2 (1.1)	< 0.001

2. Upper-level students also had more positive experiences with the project.

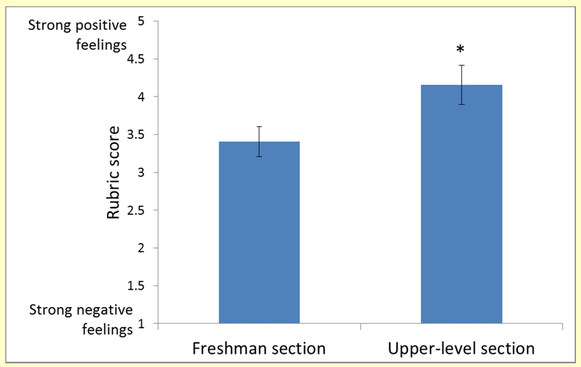


Figure 1. Mean student responses to the question, "Please describe your general feelings toward the service project."

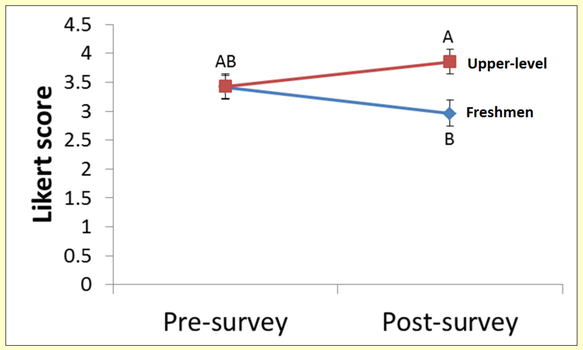
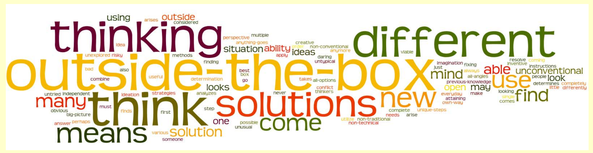


Figure 2. Student response to, "I am interested in learning more about plants in the future." 1 = strongly disagree, 5 = strongly agree.

Table 2. Mean (SE) Student survey responses on a Likert scale, with 1 = strongly disagree, 5 = strongly agree.

Question	Freshman Section	Upper-level Section	T-test *p-value*
This activity made me more aware of community needs.	3.64 (0.18)	3.76 (0.21)	0.649
I think this project made a difference in my community.	2.96 (0.18)	3.19 (0.16)	0.346
This class should do this project again in the future.	3.44 (0.19)	4.25 (0.16)	0.002
I had a voice in shaping this activity.	3.44 (0.21)	3.91 (0.17)	0.085
This activity helped me better understand what we were doing in class.	3.18 (0.25)	3.76 (0.12)	0.046
This activity has increased my interest in participating in other community service activities.	3.13 (0.24)	3.43 (0.20)	0.345
Plant biology is relevant to my life.	3.09 (0.27)	3.95 (0.20)	0.015

3. To students, creative problem-solving meant "thinking outside the box."



While, risk-taking meant moving beyond, and outside the "comfort-zone," and trying new things.

4. Upper-level students had more concrete strategies for dealing with loosely-structured projects than freshmen (Figure 3).

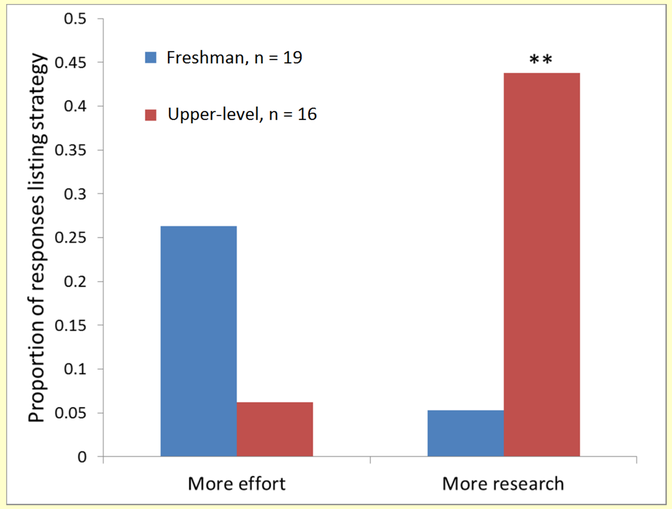


Figure 3. Categorized student response to, "How would you increase your risk-taking on this project?"

Discussion

While the difference in project type potentially confounds this study, it convincingly demonstrates that **freshmen need to be more explicitly provided with strategies for success**, reinforcing the idea that explicit guidance is more effective in helping students to think creatively, especially at lower levels of academic development (Scott et al. 2004).

Future work will explore and implement: 1) effective ways of teaching creative problem-solving, 2) better assessment of creativity, 3) structuring service-learning projects with a balance of scaffolding that facilitates student success while at the same time encouraging creative expression.

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