

Project Overview

Modern nations and societies require novel responses to an increasingly complex set of challenges. In this global context, higher education institutions have been charged with graduating innovators. While innovation is gaining increased attention within higher education, there has been little empirical assessment to determine what works, why, and for whom to effectively cultivate this important educational outcome.

Led by Dr. Matthew J. Mayhew of The Ohio State University, this project asks: What is the influence of collegiate experiences on students' innovation capacity?

Project Timeline and Population

Two samples were collected from each participating institution: a longitudinal first-year sample and a cross-sectional sample of students entering their final year of undergraduate study. All first-year students were given a pretest in fall, 2015; those who responded were provided a posttest in spring, 2016. Senior year students were sampled during the 2015-2016 academic year using the posttest instrument. Overall, the project engaged **17,940** students and achieved **4,093** responses—a project-wide response rate of **22.8%**.

A diverse and representative sample of **9** colleges and universities are included in this project. These include public and private institutions, research universities and liberal arts colleges, and institutions located in the United States, Canada, and Qatar.

Outcome Measure

The outcome measure for this study was the *innovation capacity score*, a combination of students' responses to questions regarding their intrapersonal awareness, social skills and cognitive abilities related to innovation.

Learning Environment and Experiences

To examine multiple aspects of the student experience, we used reliable and valid measures to assess students' perceptions of the following:

Academic Life: Quality of non-classroom interactions with faculty; that faculty challenge ideas and viewpoints; exposure to assessments that encourage argument development; having assessments that encourage innovative approaches to problem solving.

Co-Curricular Life: Campus is supportive of innovation (e.g., creating new clubs); on-campus social experiences encourage generating and executing new ideas; out-of-class experiences provide opportunities to connect in-class learning with personal growth (i.e., connecting experiences); level of support for personal career development.

Other Resources: Library and other non-academic, non-social support services promote innovation.

Institutional Sample

Below are key descriptive statistics for the **781** students who completed the survey at the University of Montana.

Gender	Count	Percent
Female	519	66.4
Male	241	30.9
Other Response	21	2.7
Class Year	Count	Percent
First Year	404	51.7
Senior Year	377	48.3
Race/Ethnicity	County	Percent
Asian/Asian American	24	3.1
Bi/Multi Race	77	9.9
Native American	15	1.9
White	632	80.9
Other Race	33	4.2
Major (Aggregated)	Count	Percent
Arts/Humanities	111	14.2
Biology	110	14.1
Business	93	11.9
Education	38	4.9
Engineering/Math/Sciences	38	4.9
Health Professional	133	17.0
Social Sciences	120	15.4
Double Major	67	8.6
Other Major/Undecided	71	9.0

Analysis and Presentation of Results

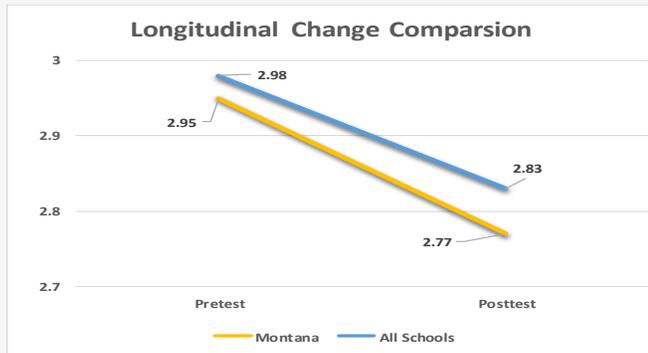
To better understand the influence of college on students' development of innovative capacity, we conducted two sets of analyses. The first used the longitudinal data (first-year pretest - posttest) to determine the influence of first-year experiences on the outcome after considering students' incoming characteristics (e.g., gender, race) and initial innovation capacity scores.

The second employed cross-sectional data to compare all students at the end of the first-year to seniors, again with considerations for students' incoming traits. Between institution (i.e., all schools *except* Montana) and within-institution (Montana only) analyses were performed to provide the fullest picture possible given the data collected.

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Longitudinal First-Year Sample

We compared the average longitudinal change scores of students at your institution to those at the other institutions.

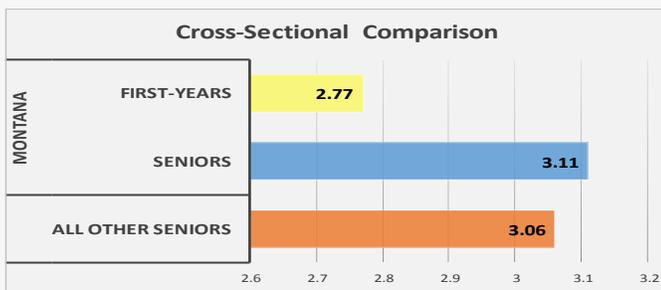


Across the project and at Montana, first year change on the innovation score was overall slightly negative.

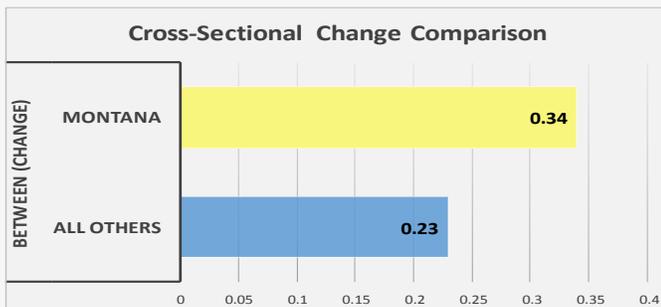
Inferential analyses determined if any environmental features were associated with higher innovation scores on the posttest. Looking at all other institutions, and accounting for pretest score, three features were salient: taking a class associated with innovation, positive faculty interaction, and exposure to assessments that encouraged innovative problem solving. In contrast, when similarly analyzing only Montana students, **connecting experiences** (i.e., applying in-class learning to real-world problems) were most significant.

First-Year to Senior Comparison

We also compared first-years and seniors at Montana, as well as Montana seniors to seniors at all other schools.



We then compared the within-school difference to the average first-year to senior change at all institutions.



Cross-Sectional Analysis

Conducting inferential analyses determined which environmental features were associated with change during college. Looking at all other institutions, and accounting for differences including class year, four features were significant: connecting experiences, career development support, assessments that encouraged argument development, and faculty interaction. At Montana, however, the most influential experience was having **on-campus social experiences** that promoted innovation (e.g., collaboration, informal idea exchange). In addition, **connecting experiences, career development support, and positive interactions with faculty** were also influential.

Discussion and Implications

What do these findings tell us about your institution? Montana students followed the common pattern with regard to developing innovation capacity: slightly lower scores between the beginning and end of the first-year followed by comparative gains between the end of the first-year and the senior year. Notably, the difference between first-years and seniors at Montana achieved statistical significance, as did the mean change score when compared to all other schools.

From the inferential analyses, we discovered that innovation capacity among Montana students was primarily driven by participation in classroom pedagogies where faculty applied new concepts and ideas to life situations **and** positive relationships with faculty. Also, the demonstrated importance of on-campus social experiences in relationship to innovation capacities in the cross-sectional analysis was unique to Montana — suggesting that Montana’s commitment to innovation capacity building may be extending its reach into the general campus milieu. This distinctive finding is one that Montana should find exciting.

Given these findings, we offer three implications. First, based on the strength of experiences that connect the curriculum and co-curriculum, we encourage Montana to further investigate specifically *which* forms of experiential and/or out-of-class learning are already working to benefit the most students. Investigation here might reveal certain programs, services or educators that are optimally promoting innovation, inviting opportunities for programmatic scaling. Second, we encourage Montana to explore teaching all faculty how to include classroom practices that encourage applying knowledge to students’ lives and experiences outside of class. Working with existing teaching and learning centers on campus will be critical in this regard. Finally, UM should consider including innovation capacity development as an institutional priority codified in strategic planning documents. Of course, careful assessment of this priority should remain central to UM’s vision for preparing its students to be innovators.

Acknowledgements

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