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# Assessment of Community College Students' Analytical Reasoning Skills and Engagement in Deep Learning

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and Engagement in Deep Learning

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### Study Purpose

This study investigates the effectiveness of implementing High Impact Practices (nationally recognized teaching and learning practices) across the disciplines. The findings will help to inform our practices to improve undergraduate students' academic performance. The analysis of students' analytical reasoning skills will help us to determine how effective HIPs have been at enhancing this particular student learning outcome (SLO).

### Theoretical Framework

George Kuh's research (2008) used the large datasets of the National Survey of Student Engagement (NSSE) and other indirect measures in order to draw connections between High Impact Practices (HIPs) and student learning. Kuh's research examined students' self-reports of their learning and he concluded that the use of HIPs instilled in students the willingness to seek challenges and persist. The HIPs that Kuh included in his research were: (1) first-year experience/seminar; (2) common intellectual experiences; (3) collaborative assignments and projects; (4) diversity/global learning; (5) service-learning/community-based learning; (6) learning communities; (7) writing-intensive courses; (8) internships; and (9) undergraduate research. Moreover, Kuh concluded that these HIPs have a pronounced effect on the experiences of underserved students (2005).

Finley and McNair's follow-up study (2013) on the impact of HIPs on college students' academic performance involved underserved populations among NSSE survey respondents and included student responses in focus groups aimed at qualifying the impact of HIPs from the students' perspectives. The study used a mixed-methods approach to examine the relationship between participation in HIPs and the underserved students' success and learning. The study revealed that students who participated in a HIP perceived their learning to be significantly enhanced as compared to students who did not participate in

that particular HIP. Overall, students reported gains in general education, practical competence and personal and social development.

In other research involving the effectiveness of HIPs on student learning, Stevens (2014) described findings from a college's service-learning, writing-intensive, semester-long first year seminar. This first year seminar is designed to achieve the following three student-learning objectives: (1) reading critically; (2) participating productively in course discussion; (3) and writing clearly which are assessed using three rubrics, one for each area. In this study, the first year seminar focused on poverty and public policy with a service-learning component where students contributed to writing grant proposals for various local community agencies to use to support their organizations.

Stevens used a scale from 1 (strongly disagree) to 5 (strongly agree), students self-reported that the service-learning activities increased their understanding of course material ( $M=4.17$ ,  $SD 0.94$ ) and helped them see connections between academic content *and the* 'real world' ( $M=4.67$ ,  $SD 0.95$ ). Students self-reported that working as part of the collaborative team was helpful to the grant-writing process ( $M = 4.83$ ,  $SD 0.67$ .) Responses to the service-learning activities on improving their writing and argumentation skills were more neutral ( $M= 3.75$ ,  $SD 0.97$  and  $3.50$ ,  $SD 1.17$  respectively). A recommendation from this study noted that in order to support writing development, service-learning and writing-intensive classes may require more explicit in-class instruction in writing.

The research reviewed and the developmental goals of QCC point towards a need to learn more about the quality of HIP implementation, to better understand learning from student self-reports and most importantly to gather hard evidence of actual student learning.

### *Questions*

1. What are students' levels of engagement in deep learning activities from participating in courses with HIPs as compared to students who do not participate in a HIP?

2. What are the student learning outcomes for analytical reasoning skills in HIP and non-HIP courses?
3. What are the student learning outcomes for each of the various HIPs?

## Methodology

### *Participants*

This study consisted of diverse, urban community college students 18 years and older who are a representative sample of 200 HIP and 200 non-HIP participants across the disciplines.

### *Measures*

#### *Analytical Reasoning*

Students were given an assignment by their instructor that will measure the QCC general education outcome: “Students will use analytical reasoning to identify issues or problems and evaluate evidence in order to make informed decisions.” These analytical reasoning assignments were evaluated using a rubric developed by faculty. The rubric consists of three dimensions and five levels (see Table 1).

#### *Survey of Student Engagement/Deep Learning*

Students in HIPs and non-HIP course sections were given an online survey assessing their level of engagement/deep learning in the course via the website [www.surveymonkey.com](http://www.surveymonkey.com). The survey consisted of 14 questions rated using a 5-point Likert agreement scale.

### *Design*

The study employed a mixed between-within nonequivalent control group design to assess and compare student analytical reasoning skills of HIPs and non-HIP participants. The independent variable was the use of HIPs and the dependent variables were the analytical reasoning skills and student engagement/deep learning measures. The study employed a between-subjects design in that the HIP and non-HIP groups are compared for analytical reasoning. It also employed a within-subjects design within the HIPs group, as the scores from the self-reported engagement/deep learning courses across the various HIPs were assessed. Further, we disaggregated the data according to which HIP(s) are employed in each course.

### *Procedure*

Students in the HIP classes participated in HIPs in their courses as implemented by their instructor, whereas the non-HIP classes participated in their courses without a specified HIP. Students in the HIP and non-HIP classes submitted artifacts to be assessed for analytical reasoning skills. They were asked to complete a survey of student engagement/deep learning. Faculty members were trained to use the rubric to score the artifacts with an acceptable level of inter-rater reliability.

## Results

### *Survey Results*

The End of Semester Student Survey of High Impact Practice Experiences gathered students' perceptions of how courses encouraged or required them to participate in activities designed to stimulate deep learning. The survey also asked students how they benefited from their experiences with HIPs during the semester and how much they felt involved with the college. Survey responses of students

taking HIP courses were compared with responses from students who did not take any HIP courses during the semester.

Results indicated that thirteen types of deep learning-stimulating activities/practices were experienced by students in both HIP and non-HIP courses. The use of a control group and the formation of sub-groups allowed for analyses and the establishment of evidence that courses utilizing HIPs employed practices and activities to enhance deep learning, to a greater degree than non-HIP courses. In particular, HIP courses more extensively required/encouraged: 1) working on projects with other students 2) synthesizing information from multiple sources to create new ideas, and 3) considering the perspectives from peoples of other backgrounds and cultures. By comparison, students who experienced only the Writing Intensive HIP showed evidence of experiencing activities for deep learning similar to that of the control group, students who had no HIP experience in spring 2015. This provides evidence that Writing Intensive (WI) courses are not currently implemented in a manner to enhance deep learning beyond what would be found in a non-HIP course. Students who experienced HIPs, including WI, expressed greater degrees of connectivity to Queensborough Community College, especially those experiencing multiple HIPs.

### *Analytical Reasoning*

As part of the direct measure of student learning, 24 raters assessed 478 analytic rubric artifacts. Before they rated the artifacts they were normed on the analytic rubric. Faculty evaluated 276 HIPs artifacts for Analytical Reasoning. The HIPs that were involved in this assessment project were Academic Service Learning, Students Working in Interdisciplinary Groups (SWIG), Global and Diversity Learning, Learning Communities, Common Intellectual Experience, Writing Intensive, and Undergraduate Research. The total weighted average score across all the HIPs on the analytic rubric was 7.16 out of 12 *or* 2.39 which represented competence at the lower middle Developing range of the rubric.

Faculty evaluated 202 non-HIPs Analytic artifacts. The total weighted average score across the three dimensions of the analytic rubric was 7.59 out of 12 or 2.53 which represented competence in the Developing range of the rubric.

Overall almost all artifacts scored within the developing range across all dimensions of the analytic rubric. Since this rubric was designed to measure performance up to a four year college level, the assessment of developing for two year students would be expected.

On every dimension of this rubric the non-HIPs artifacts, on the average, scored higher than all the HIPs artifacts except Undergraduate Research, which had the highest scores of all the artifacts, on every dimension of the Analytic rubric. Undergraduate Research appears to intentionally address each dimension of the rubric; therefore, it is not surprising that the scores for the artifacts of this HIP were higher than the other six HIPs and for the non-HIPs courses as well. It should be noted, however, that the Undergraduate Research HIP was represented by only one class assignment (19 artifacts), so any summative conclusions would be pre-mature (Steele and Beckford, 2015).

### Educational Implications

The findings were shared with the college community and with groups working closely with HIPs to provide feedback on the quality of HIP implementation and student learning outcomes. In addition, findings confirmed that a college-wide goal of HIPs was met, that is, to improve student connectivity to the college. Based on these results, the Survey of High Impact Practice Experiences will be replicated to ensure consistency in implementation methods. In future research, other direct measures of student learning will be employed to determine the effectiveness of each particular HIP.



**Table 1:** Rubric for QCC Educational Outcome #2: Use Analytical Reasoning to Identify Issues or Problems and Evaluate Evidence in Order to Make Informed Decisions

**ANALYTICAL REASONING RUBRIC**

<b>DIMENSIONS</b>	<b><u>Superior - 4</u></b>	<b><u>Competent - 3</u></b>	<b><u>Developing - 2</u></b>	<b><u>Novice - 1</u></b>	<b><u>Insufficient - 0</u></b>
<b>Issue: Identify and explain the issue, problem, or question.</b>	Clearly and comprehensively identifies and explains the issue, problem, or question	Clearly and sufficiently identifies and explains issue, problem, or question with minor omissions	Partially identifies and explains the issue, problem, or question with some explanation	Minimally identifies and explains the issue, problem, or question without explanation	Does not identify or explain the issue, problem, or question
<b>Evidence: Present, organize, and evaluate sufficient and relevant evidence.</b>	Clearly and comprehensively presents, organizes, and evaluates sufficient and relevant evidence	Clearly presents, organizes, and evaluates relevant evidence with minor omissions	Partially presents, organizes, and evaluates mostly relevant evidence	Minimally presents, organizes, and evaluates some relevant evidence	Does not present, organize or evaluate sufficient relevant evidence
<b>Conclusion: Reach an informed conclusion or solution.</b>	The conclusion is a clear, well supported, and logical statement that reflects the complexity of the argument or problem	The conclusion or solution is sufficiently supported by the provided evidence	The conclusion is unfocused or minimally supported by the provided evidence	The conclusion is ambiguous, illogical, or unsupported by the provided evidence	The conclusion is absent

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