

Abstract Title Page

Title:

Providing Opportunities for Deeper Learning: Findings from the Study of Deeper Learning

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Abstract Body

Problem / Background / Context:

Researchers, policy makers, and practitioners are increasingly interested in the development of the core competencies associated with *deeper learning*, including mastery of core academic content, critical thinking and complex problem-solving, ability to work collaboratively, effective communication, learning how to learn, and the development of academic mindsets, as a way to better prepare all students for college and careers (Trilling, 2010). Initial research has focused on demonstrating the effectiveness of individual programs associated with deeper learning (Collins, et al., 2013; Guha, et al., 2014; Nichols-Barrer and Haimson, 2013). However, a recent National Research Council (NRC) panel identified a need for more rigorous research to fill gaps in the evidence base (NRC, 2012). There remains a need to determine whether deeper learning, which takes many forms in practice, is associated with improved educational experiences for students of all backgrounds.

Purpose / Objective / Research Question / Focus of Research:

The *Study of Deeper Learning: Opportunities and Outcomes*, funded by the William and Flora Hewlett Foundation, is a *proof-of-concept* study to determine whether students attending high schools with a mature and at least moderately well-implemented approach to promoting *deeper learning* experience greater deeper learning opportunities and outcomes than they would have had they not attended these schools. The study examined high schools associated with ten established networks from across the country that embrace the goals of deeper learning and promote instructional practices they believe are likely to lead to deeper learning competencies. To determine whether students who attend these schools experience different opportunities and outcomes relative to similar students who do not attend these network schools, the study included a sample of students from “non-network” comparison schools. In this paper, we focus on two central questions guiding the study:

- (1) Do students attending network schools have more opportunities to engage in deeper learning processes than they would have if they had not attended the network schools, and
- (2) Do individual students who experience more opportunities to engage in deeper learning achieve better deeper learning outcomes than students who experience fewer opportunities?

These questions address two of the fundamental assumptions of the Hewlett Foundation’s deeper learning initiative: 1) that schools explicitly focused on deeper learning are indeed providing the opportunities they set out to provide, and do so for all students, and 2) that a relationship exists between an individual student’s exposure to deeper learning opportunities and key outcomes, regardless of participation in a network school. These assumptions are critical for an analysis of the *outcomes* of the deeper learning network schools, which we provide in paper #3.

Improvement Initiative / Intervention / Program / Practice:

The *Study of Deeper Learning* examined students’ experiences and outcomes within a sample of network schools that were implementing instructional approaches aligned with deeper learning. The networks and schools differed in their approaches to deeper learning, but some features were common across network schools. For example, all schools engaged students in some form of project-based learning that focused on the development of problem-solving skills, collaboration skills, and/or communication skills, while engaging students in real-world experiences. Schools

were engaged in authentic assessment practices including portfolios and exhibitions, and teachers used frequent formative assessments to gauge student learning and inform instruction. In addition, schools provided personalized learning environments to engage students in learning and provide individualized support.

Setting:

This analysis relies on data from schools located in six districts across two states: California and New York.

Population / Participants / Subjects:

The sample of schools for this analysis included a set of moderate- to high-implementing network high schools and a set of schools serving similar student populations in the same jurisdiction as the network school, but not belonging to one of the 10 networks. Our goal was to identify and recruit a “non-network” school with similar student characteristics for each network school so that we could conduct student-level analyses with similar student populations across the two groups of schools. Specific criteria for school and student sampling are included in the abstract for paper #1. For the analysis and findings described in this paper, we collected data from students within 12 network high schools, which represented 8 of the 10 networks and were located in five districts across two states.¹ Analyses also include students attending 10 non-network schools located in six districts across two states. One non-network school was matched to two network schools, for a total of 11 school pairs.

Research Design:

This study used a quasi-experimental design to collect and analyze data from students within pairs of network and non-network schools operating in the same or similar district contexts, as described in paper #1. We used propensity score matching to identify students in the comparison schools who, at entry to 9th grade, shared similar characteristics (including prior achievement) to those in the treatment schools. For the results reported in this paper, we focused on a survey and assessment administered to students in 11th and 12th grades in 2012-13. This quasi-experiment has several limitations, outlined in paper #1. First, as a proof-of-concept study, the study was not designed to be generalizable across all possible contexts. In addition, while we matched and weighted students on a series of measured characteristics (e.g., 8th grade incoming achievement), the design does not account for any unmeasured characteristics associated with students’ attendance at network schools.

Data Collection and Analysis:

The primary data sources used for the analysis in this paper include:

- **Student survey data:** We administered a one-hour survey to all consented and sampled 11th and 12th grade students in each network and non-network school in spring 2013. The focus of the survey was twofold: 1) to measure opportunities students experience in school related to the six deeper learning competencies, and 2) to measure intra- and inter-personal competencies and dispositions that are considered important to college and career readiness. For a list of the constructs measured in the survey, see Appendix Exhibit 1. The survey enabled us to gather data from a large representative sample of students

¹ Two of these network schools were combined for analyses since they had small student populations eligible for the study and were co-located on one campus.

across both network and non-network schools. In total, we administered surveys to 1,762 students from the 11 pairs of schools with an average response rate of 76%.

- **OECD PISA-based Test for Schools:** We administered the OECD PISA-based Test for Schools to all consented and sampled 11th and 12th grade students in each network and non-network school in spring 2013 to measure higher-order skills including complex problem solving in reading, mathematics, and science.² In total we administered the assessment to 1,267 students, with an average response rate of 61%³
- **Qualitative data:** We conducted 2-day visits to all network schools participating in the study and interviewed network leaders. These data provide illustrative examples of the types of opportunities for deeper learning provided to students.

To address the first research question, we performed doubly robust ordinary least squares regression models that applied propensity score weights and accounted for student demographics and pre-high school (i.e., middle school) achievement. In addition to propensity score weights, we also calculated and applied weights that accounted for consent, sampling, and non-response. We performed student-level analyses separately within each pair of network and non-network schools, and then calculated the precision-weighted average difference between network and non-network students across the 11 pairs of schools using a fixed effects meta-analysis. We also examined differential effects by student subgroup.

To address the second research question, we used a general three-level hierarchical linear model to estimate both within-school and between-school relationships between opportunity measures and outcomes. These models accounted for the nesting of students within schools, and adjusted for student-level 8th grade characteristics.

Findings / Outcomes:

The primary findings include:

- *Students in participating network high schools reported significantly greater opportunities for deeper learning than students in the paired non-network schools.* These significant differences held true for *all* measures of opportunities for deeper learning, with average effect sizes ranging from 0.21 (assessments aligned with deeper learning) up to 0.55 (opportunities to collaborate) (see Appendix Exhibit 2). We observed the largest associations between network school attendance and opportunities for deeper learning in the areas of collaboration, interdisciplinary learning, feedback to students, and communication.
- While we focus on the average effect of network school attendance, *at the individual pair level, students in each of the 11 network schools reported significantly more opportunity for deeper learning on at least one opportunity measure than students in the paired non-network school. In addition, we observed no negative effects of network attendance on opportunities within any individual pairs.*
- We also explored whether *all* students in the network schools are experiencing these opportunities, or whether opportunities for deeper learning are differentially experienced

² For the purposes of this research we received approval to use the test with older age students than the international norming sample.

³ One pair of schools was included in the survey sample but not the OECD PISA-based Test for Schools sample.

by subgroups of students. We focused on three categories: students with different levels of prior achievement, gender, and grade level. *Out of these categories, only gender and grade level revealed differences in the effects of attending a network school on opportunities for deeper learning. Specifically, we observed a larger positive effect of network school attendance on opportunities for females than males. We also found larger positive effects of network school attendance for 12th graders than 11th graders on some opportunity measures, including opportunities to learn how to learn, opportunities for creative thinking, opportunities for real world connections, and feedback to students.*

- Finally, we examined the relationship between the opportunity for deeper learning measures and 1) the dispositional outcomes measured in the student survey and 2) students' performance on the OECD PISA-based Test for Schools, regardless of network participation. *Overall, we found a statistically significant correlational relationship among all measures of opportunities for deeper learning and all measures of dispositional outcomes. We also found that the measure of opportunity for complex problem solving had a positive, statistically significant relationship with OECD PISA-based Test for Schools scores, including reading, math, and science.*

In addition to these findings, the paper presented will include illustrative examples from case study data of the types of deeper learning opportunities experienced by students.

Conclusions:

The findings outlined in this paper provide a strong foundation for further exploration of the outcomes of deeper learning. They support several key assumptions underlying the deeper learning approach and demonstrate that schools *can* provide greater opportunities for students to develop the deeper learning competencies, and can do so for students from a wide range of ability levels. They also demonstrate a fundamental positive relationship between these opportunities and several outcomes, including dispositional outcomes and ability to solve complex problems. For further generalizability, we recommend additional studies to replicate these findings in additional schools and a wider range of contexts. Key take-aways include:

- *Mature, moderately well implementing deeper learning network high schools serving substantial populations of disadvantaged students were successful in providing greater opportunities for students to engage in deeper learning.* Analyses of student survey data confirmed the first core assumption of the deeper learning initiative – that schools explicitly focused on deeper learning and supported by one of the ten networks offered greater opportunities for deeper learning. The consistent, positive findings are notable given the wide range of deeper learning approaches and practices in the schools.
- *The relationship between network school attendance and opportunities for deeper learning did not differ based on students' levels of prior achievement,* indicating that opportunities were provided not just to students enrolled in more advanced courses or who had greater academic success in the past.
- *Opportunities experienced by individual students were associated with deeper learning outcomes.* This relationship confirms another underlying assumption of the deeper learning initiative – that students who experience greater opportunities for deeper learning also demonstrate improved deeper learning outcomes, including complex problem-solving skills (as measured by the OECD PISA-based Test for Schools) and dispositional outcomes considered important for college and career readiness.

Appendices

Appendix A. References

- Collins, S., Davis-Molin, W., Conley, D. (2013). *Journey Toward Deeper Learning: An Evaluation of the Roadtrip Nation Experience in the San Jose PLUS Academies*. Eugene, OR: Educational Policy Improvement Center.
- Guha, R., Adelman, N., Arshan, N., Bland, J., Caspary, K., Padilla, C., Patel, D., Tse, V., Black, A., & Biscocho, F. (2014). *Taking stock of the California Linked Learning District Initiative: Fourth-year evaluation report*. Menlo Park, CA: SRI International.
- National Research Council. (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Washington, DC: The National Academies Press.
- Nichols-Barrer, I. & Haimson, J. (2013). *Impacts of Five Expeditionary Learning Middle Schools on Academic Achievement*. Cambridge, MA: Mathematica Policy Research.
- Trilling, B. (2010). *Defining Competence in Deeper Learning* (draft report to the Hewlett Foundation). Menlo Park, CA.

Appendix B. Tables and Figures

Exhibit 1: Rasch Reliabilities for constructs measured in the student survey

	Rasch reliability
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<i>Opportunities for deeper learning</i>	
Opportunity for Complex Problem Solving	0.9
Opportunity to Communicate (combined)	0.83
Opportunities to Collaborate	0.69
Opportunity to Learn How to Learn	0.52
Assessments Aligned with Deeper Learning	0.77
Feedback to Students	0.75
Interdisciplinary learning	0.78
Opportunities for Creative Thinking	0.79
Real World Connections	0.84
<i>Dispositional outcomes</i>	
Collaborative Orientation	0.83
Creative Orientation	0.77
Perseverance	0.79
Self-Management	0.81
Academic Engagement	0.74
Motivation to Learn	0.75
Self-Efficacy	0.84
Locus of Control	0.73
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Exhibit 2: Estimated Network School Effects for Opportunities to Learn

