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Results from a Two-Year Study of the Effects of Extended Learning Opportunities on Student Outcomes in New Hampshire

Prepared by Research for Action

AUTHORS

M. Kate Callahan, Ph.D.

Kasey Meehan

Dae Y. Kim, Ph.D.

Lucas Westmaas

ABOUT RESEARCH FOR ACTION

Research for Action (RFA) is a Philadelphia-based nonprofit organization. We seek to use research as the basis for the improvement of educational opportunities and outcomes for traditionally underserved students. Our work is designed to: strengthen public schools and postsecondary institutions; provide research-based recommendations to policymakers, practitioners, and the public at the local, state, and national levels; and enrich the civic and community dialogue about public education. For more information, please visit our website at www.researchforaction.org.

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I. INTRODUCTION

In 2005, New Hampshire shifted from "seat-time" requirements for grade-level advancement and graduation to a competency-based education system. The state subsequently required all local school districts to adopt and implement a competency-based assessment process and to define course-level competencies so that credits toward graduation could be awarded based on mastery.[1] Since 2008-09, the New Hampshire Department of Education has spearheaded the implementation of extended learning opportunities (ELOs) as a component of competency-based programs in high schools across the state. The state defines extended learning as the "acquisition of knowledge and skills through instruction or study outside of the traditional classroom methodology, including, but not limited, to apprenticeships, community service, independent study, online courses, internships, performing groups and private instruction."[2] School districts do not have to adopt ELOs; however, those that offer ELOs are required to have a policy for granting credits for students who successfully demonstrate competencies as a result of their participation.

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[1] State policies regarding Competency Assessment of Student Mastery and ELO policies for offering districts are defined in New Hampshire Department of Education Technical Advisory #12: http://www.education.nh.gov/standards/documents/advisory12.pdf

[2] Extended Learning Opportunities definition on New Hampshire Department of Education website: http://www.education.nh.gov/innovations/elo/

ELOs are now offered by a majority of New Hampshire school districts. To date, there has been no rigorous, systematic analysis of the implementation of the intervention and how it varies by context and conditions. Nor has there been an examination of its impact on students' preparation for postsecondary education and employment, or a specific analysis of how ELOs could benefit disadvantaged students in particular. With funding from the Nellie Mae Education Foundation, Research for Action conducted a two-year study that addresses this research gap.

Purpose of This Report

The purpose of this report is to provide a comprehensive analysis of ELO program effects in New Hampshire. Specifically, we examine how various components of district and school-level ELO implementation relate to student participation and how ELO participation influences interim and longer-term student outcomes. The report also provides some sub-group analyses exploring the unique effects of ELO participation on the outcomes of at-risk students. These analyses follow a two-year data collection process, during which Research for Action constructed a robust data set in partnership with the state's Department of Education and 22 high schools[3]. We also administered a statewide survey to all New Hampshire schools implementing ELOs in order to better understand their effects across the state.

Research Questions

The ultimate goal of this research study was to build an understanding of how participation in ELOs affects student outcomes. Using a mixed-methods design, the study asks two overarching questions:

1. How does the quality of implementation at the school level influence student participation in ELOs?

2. What are the effects of ELO participation on short-term and longer-term student outcomes?

Overview of Report

This report is organized into the following sections:

II. **A Conceptual Framework for New Hampshire ELO.** This section introduces a background and a broad framework for understanding ELO implementation statewide.[4]

III. **The Context and Quality of Implementation across New Hampshire High Schools.** This section describes findings from a statewide survey of ELOs in New Hampshire schools. Survey data capture the variation in context and quality of ELO implementation.

IV. **Descriptive Profile of Study Schools and Participants.** This section describes the 22 study schools included in our deeper analysis and the variation in ELO implementation across those schools. This section also describes the student population of the 22 study schools, specifically comparing key characteristics of ELO takers.

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[3] In spring of 2014, Research for Action sent a letter to every high school principal in the state of New Hampshire inviting them to participate in a two-year study of how ELOs impact student outcomes. Twenty-two schools fully participated in the study by providing student-level data on ELO participation as well as student outcomes data for all students enrolled during academic years 2013-2014 and 2014-2015.

[4] This conceptual framework was developed by Research for Action in March of 2014 and submitted to the Nellie Mae Education Foundation in April. It originally appeared in the report: Callahan, M. K. (2014). *Early Report and Project Update: A Working Measurable Framework of ELO as a Competency-Based Learning approach in New Hampshire.* The conceptual framework has not changed.

V. **Predictors of ELO Participation.** This section analyzes the relationship between quality implementation and student participation in ELOs. This section also examines the student characteristics that predict participation in ELOs.

VI. **The Impact of Extended Learning Opportunities on Student Outcomes.** This section examines the effects of ELO participation on interim and longer-term student outcomes. Findings are presented for the full sample and for two sub-samples of underserved students.

VII. **Conclusion.** The final section synthesizes our analysis and offers implications for high-quality ELO implementation in New Hampshire.

I. A CONCEPTUAL FRAMEWORK FOR NEW HAMPSHIRE ELO

ELO implementation in New Hampshire involves stakeholders at the state, school, and community levels, and it varies considerably across schools and districts. To capture this complexity, we developed a conceptual framework that identifies key components (inputs and outputs) of ELO in New Hampshire (see Figure 1). Although this two-year study did not address all of the elements present in the framework, it is helpful to understand the broader context in which this study is situated. The components included in the model were identified through a review of extant literature on ELOs and were triangulated with data gathered through interviews with ELO stakeholders, as well as document review of ELO reports and presentations from the New Hampshire Department of Education.[5]

[5] The conceptual framework was also reviewed and approved by the Nellie Mae Education Foundation and the New Hampshire ELO Coordinators' Group.

Figure 1. Conceptual Framework

PRECONDITIONS	HIGH QUALITY ELO IS IMPLEMENTED	OUTCOMES	
		SHORT-TERM/INTERIM	LONGER-TERM
State Level Preconditions • State policy for ELO • Funding for ELO early implementation • State-generated assessment rubrics • State ELO coordinators' group	**State Level High Quality Implementation Indicators** • Active ELO coordinators group		
District/School Level Preconditions • **District adopts an ELO policy** • **Funding designated for ELO** • **Strong and consistent school leadership**	**District/School Level High Quality Implementation Indicators** • **School administrator that demonstrates commitment to the ELO initiative** • **Funding allocated to ELO** • **Designated ELO coordinator as a paid position** • **Active membership in statewide ELO coordinators network** • **Highly qualified teachers from all disciplines are trained and willing to sponsor an ELO** • **Multiple types of ELO available** • **Active reltionships with community mentor/partners**	**District/School Level** • The expansion of the curriculum • The introduction of more rigorous standards to extant school offering • **Increased capacity in competency-based teaching and assessment practices** • **Tailoring of learning opportunities to meet student interests** • More personalized relationships between teachers and students	• Increased graduation rates • Increased postsecondary enrollment • **Established alternative learning practices that foster 21st century learning skills**
Community Level Preconditions • Professional and practicing mentors are willing and able to partner with school and student to host an ELO • Mentors' job-sites offer exposure to current equipment and technology • Mentors' job-sites offer safe, elcoming environments	**Community Level High Quality Implementation Indicators** • **Community organizations/professionals establish partnerships with schools to provide ELO opportunities** • **Community mentors collaborate with ELO coordinators and sponsoring teachers**	**Community Level** • **Increased connectedness between community mentors and schools** • Mentors find relationships with student personally rewarding • Increased organizational capacity from student workers	• Attract future emplyees from ELO students • Broader community investment in schools • Robust workforce with 21st century skills
Student Level Preconditions • **Student characteristics (race/ ethnicity, socioeconomic status, academic and behavioral performance)**	**School/Student Level High Quality ELO Implementation Indicators** • **Students participate in creating their personalized learning plans** • **Students are engaged in hands-on, self-directed, and personalized competency-based learning** • **Students' ELOs include four key components of rigorous ELO (research, reflection, product, and presentation) and are assessed for each** • **Students complete ELO and earn credits that count for core and elective credits** • **Students who engage in ELO reflect the diversity of the school's entire student population in terms of race/ethnicity, socioeconimoic status, academic and behavioral performance**	**Student Level** • **Increased/sustained student engagement** • **Increased/sustained academic commitment** • **Increased/sustained self-confidence** • **Increased work readiness skills** • **Mastery of ELO competencies** • **Postsecondary aspirations**	• **Academic mastery** • **Postsecondary preparedness** • **Self-driven learners**

Note: *Bold, no shading=Constructs measured in RFS's 2014-2016 study*
Bold, shading=Constructs that will be added in proposed study

The conceptual framework organizes the components into three categories: 1) preconditions, 2) high-quality implementation indicators, and 3) outcomes. Each of these categories is defined below.

Preconditions

Preconditions are contextual factors at the state, district, school, community, and student levels that set the stage for high-quality ELO implementation to take place. The framework identifies several types of preconditions:

- State level preconditions range from enacting state policies supporting ELOs to developing ELO assessment rubrics and providing professional development for schools interested in implementation.
- Examples of district and school-level preconditions include adopting supportive policies and having strong school leaders in place to champion ELO implementation.
- Community level preconditions address the availability of community mentors and businesses willing to sponsor ELOs and provide engaging and interdisciplinary real-world learning experiences.
- Student level preconditions include such factors such as race/ethnicity, socioeconomic status, and prior school experience (both academic and behavioral) that may directly or indirectly influence students' readiness to articulate a personalized learning plan that includes ELOs.

High-Quality Implementation Indicators

High-quality implementation indicators are factors at the state, district, school, community, and student levels that signify that ELOs are well designed and implemented. Most of these implementation indicators are observable at the sites of implementation, rather than the state level. They include the following:

- State level: An active ELO coordinators' network that provides continued support for expansion and deepening of ELOs.
- District/School level: Structures and personnel to support ELO, including school policies that encourage student and teacher participation, funding for a full-time ELO coordinator, an effective and supportive principal, and highly qualified teachers from multiple disciplines who are trained in facilitating and assessing ELOs.
- Community level: Partnerships between schools and community organizations and mentors that enable students to explore real-world learning in the community.
- School/Student level: Involvement of students in the ELO planning process, when the four components of rigorous ELOs (research, reflection, product and presentation) are integrated into a particular study opportunity, as well as the ability to earn credits through ELOs that count towards core and elective content requirements.

Outcomes

Outcomes are the expected interim and longer-term effects of high-quality ELO implementation at the school, community, and student levels. Competency-based education and ELOs in particular are still at nascent stages of development; while no longitudinal studies document the impact of ELOs, the literature has outlined anticipated outcomes based upon preliminary analysis of early ELO implementation.

- School level: Short-term outcomes include expanded curriculum and increased capacity among teachers for using performance assessments. Longer-term outcomes include increased graduation and college enrollment rates.
- Community level: Mentors may benefit in the short-term from the relationships they forge with students. A longer-term outcome would be a robust workforce populated by high school graduates with 21st century skills.
- Student level: Short-term outcomes range from increased student engagement and academic commitment to increased self-confidence and work readiness. Longer-term outcomes include academic mastery and postsecondary preparedness.

II. THE CONTEXT AND QUALITY OF ELO IMPLEMENTATION ACROSS NEW HAMPSHIRE HIGH SCHOOLS

In 2014, New Hampshire updated its *Minimum Standards for Public School Approval*. The new regulations guiding all New Hampshire public schools clearly state that all New Hampshire districts "shall develop local policies that identify how the district shall engage students in creating, and support extended learning opportunities."[6] While every district is required to describe its policies and expectations for ELOs, New Hampshire is also committed to local control, so there is considerable variation in how ELO programs are implemented across districts.

In spring 2015, Research for Action surveyed the ELO coordinator or the staff member most involved with extended learning at 45 New Hampshire high schools. The surveys asked the staff person to report on their school's ELO policies and the quality of their programs, using indicators drawn from the conceptual framework outlined above. In this section, we draw on the results of that survey to provide a broad illustration of how New Hampshire high schools are implementing ELOs in terms of our previously outlined district, school, and student-level indicators. More details on the survey administration and analysis are provided in the methodological note below.

[6] New Hampshire State Board of Education. (2014). *Minimum standards for public school approval*. Retrieved from http://www.education.nh.gov/legislation/documents/ed3062014-min-stands.pdf

Methodological Note: ELO Implementation Analysis

In the spring 2015, Research for Action administered a survey to 87 high schools implementing ELOs across New Hampshire. The survey instrument was designed to query school-level factors that influence the quality of implementation of ELOs. In addition, the survey captured information that related to RFA's prior work developing a conceptual framework for ELOs in New Hampshire. RFA piloted the survey with ELO coordinators from three high schools and revised the instrument based on their feedback.

RFA used a pre-existing email distribution list developed by the ELO Coordinators Network (ELON) to identify potential survey respondents. All emails included on the distribution list were verified as valid contacts for the ELO coordinator or point person at each school. For high schools not included on the distribution list, RFA scanned all remaining public schools in New Hampshire to identify the ELO coordinator or point person from each. The final distribution list included 87 ELO coordinators/point people across New Hampshire public high schools.

The survey opened on May 28, 2015 and closed on October 30, 2015. The invitation email asked for the survey to be completed by the "primary point person for ELOs" at each school. If email recipients were not the primary point person, they were encouraged to email RFA with the correct contact information. Reminder emails and follow-up calls helped to ensure the survey was completed by the best person at each school and to improve the response rate.

Additional emphasis was placed on encouraging schools in the study sample (22 schools that submitted ELO participation and GPA and credit data in 2013-2014 and 2014-2015) to respond. RFA was unable to collect survey data from two schools in our study sample.

A total of 45 individuals completed the survey, each representing a single high school, resulting in a response rate of 52%. We refer to those 45 schools as the "full sample." For schools included in RFA's study sample, the response rate was 91%.

Survey respondents were asked to provide information about ELOs from the 2014-2015 school year so that implementation data would correspond to the same timeframe as ELO participation and student outcomes data submitted for analysis by sample schools.

Appendix A provides additional information on our data collection and sampling strategy.

Evidence of High Quality District/School Level Implementation across New Hampshire Schools

We analyzed survey responses to explore the extent to which indicators of high-quality ELOs—seven district/school indicators and four student level—were present across implementing districts. The indicators included in the analysis are shown in Table 1.

Table 1. Indicators of High Quality ELO Implementation

High quality ELO implementation indicators	
District/School Level	**School/Student Level**
1. School administrator that demonstrates commitment to the initiative 2. Funding allocated to ELO 3. Designated ELO coordinator as a paid position 4. Active membership in statewide ELON 5. Teacher commitment 6. Multiple types of ELOs available 7. Active relationships with community mentors/ partners	1. Students participate in creating their personalized learning plans 2. ELOs include four components of rigorous ELO (research, reflection, product, and presentation) and are assessed for each 3. Students earn ELO credits that count for core and elective credits 4. ELO participants reflect the diversity of the school's entire student population in terms of race/ethnicity, socioeconomic status, academic performance, and behavior

Table 2 shows the percentage of schools that reported high-quality implementation for each indicator. Overall findings suggest that the majority of schools surveyed are implementing high-quality ELO programs.

Table 2. Implementation of District/School Level High-Quality Indicators across a Sample of New Hampshire High Schools (N=45)

High Quality District/School Level ELO Implementation Indicators	% of Schools Surveyed (N=45)
School administrator that demonstrates commitment to the ELO initiative (Percent of schools with administrators who are "moderately" or "to great extent" supportive of ELOs)	73%
Funding allocated to ELO (Percent of schools with at least one source of funding for ELO program)	60%
Designated ELO coordinator as a paid position (Percent of schools with designated ELO coordinator position) (Percent of respondents compensated specifically for ELO-related work)	60% 53%
Active membership in ELON (Percent of respondents that attend ELON meetings or communicate with ELO coordinators at other schools about ELOs)	36%
Highly qualified teachers from all disciplines are trained and willing to sponsor an ELO (Percent of schools with teachers who support ELOs "moderately" or "to great extent")	53%
Multiple types of ELOs available (Percent of schools with three or more types of ELO available)	82%
Active relationships with community partners (Percent of schools that complete 50% or more of their ELOs with a community partner)	60%

Notable findings:

- The two indicators most commonly reported by schools were administrator commitment to ELOs and offering multiple types of ELOs.
- Active membership in the statewide ELON was the high quality indicator reported least frequently by schools

The Importance of ELO Coordinators for High Quality Implementation

Our survey included an open-ended question that asked respondents to report the biggest challenge to high-quality implementation at their schools. Forty-four percent of schools (N=45) reported that the absence of a paid, designated person to coordinate and oversee ELOs was a barrier to high quality implementation.

To further understand how implementation varied among schools with a designated coordinator, Table 3 presents differences in the levels of implementation reported by schools with and without ELO coordinators. Moreover, Table 3 further distinguishes ELO coordinators as follows:

- "Primary role" ELO coordinators are able to prioritize ELO implementation
- "Not primary" coordinators' main responsibilities lie outside of the ELO program (e.g., a guidance counselor who spends a portion of his/her time managing the ELO program), suggesting that they might be less focused on ELO implementation.

Overall, survey findings suggest that having a designated ELO coordinator is related to high-quality implementation.

Table 3. Implementation of District/School Level High-Quality Indicators by ELO Coordinator Designation across a Sample of New Hampshire High Schools (N=45)

High Quality District/School Level ELO Implementation Indicators	Designated ELO Coordinator (n=27)		Not Designated *(n=18)*
	Primary role (n=14)	*Not primary role (n=13)*	
School administrator that demonstrates commitment to the ELO initiative (Percent of schools with administrators who are "moderately" or "to great extent" supportive of ELOs)	79%	85%	61%
Funding allocated to ELO (Percent of schools with at least one source of funding for ELO program)	100%	62%	28%
Active membership in ELON (Percent of respondents that attend ELON meetings or communicate with ELO coordinators at other schools about ELOs)	79%	31%	6%
Highly qualified teachers from all disciplines are trained and willing to sponsor an ELO (Percent of schools with teachers who support ELOs "moderately" or "to great extent")	71%	62%	33%
Multiple types of ELOs available (Percent of schools with three or more types of ELO available)	100%	62%	83%
Active relationships with community partners (Percent of schools that complete 50% or more of their ELOs with a community partner)	71%	69%	44%

Notable Findings:

- Schools with a designated ELO coordinator were more likely to report the presence of high-quality implementation indicators than schools without a designated coordinator.
- Schools with designated ELO coordinators were also much more likely than schools without designated coordinators to report having designated ELO funding, a high degree of teacher involvement, and active relationships with community partners.
- Only 6% of schools without a designated coordinator reported active participation in the ELON, compared to 79% of schools with a designated ELO coordinator for whom it was their primary role and 31% of schools with a designated coordinator for whom it was not their primary role.

Evidence of High-Quality Student-Level Implementation across New Hampshire Schools

Several survey items asked coordinators to report on student-level quality indicators listed in Table 1. Table 4 below summarizes schools' responses to these questions.

Table 4. Implementation of Student-Level High-Quality Indicators Across a Sample of New Hampshire High Schools (N=45)

High-Quality Student-Level ELO Implementation Indicators	% of Schools Surveyed *(N=45)*
Students participate in creating their personalized learning plans (Percent of schools that offer personalized learning plans)	60%
ELOs include four components of rigorous ELO (research, reflection, product, and presentation), and students are assessed for each (Percent of schools that "always" or "often" assess all four components of ELOs)	44%
Students earn ELO credits that count for core and elective credits (Percent of schools that permit students to earn core and elective credits through ELOs)	62%
ELO participants reflect the diversity of the school's entire student population in terms of race/ethnicity, socioeconomic status, academic performance, and behavior (Percent of respondents that feel all student groups benefit "moderately" or "very" from ELO participation)	60%

Notable findings:

- More than half of surveyed schools reported the presence of three of the four student-level quality indicators.
- The indicator most commonly reported by schools was the availability of students to earn core and elective credit through ELOs.
- Less than half of surveyed schools reported that they "always or often" assess students' learning outcomes using each of the four components of rigorous ELOs.

The Importance of ELO Coordinators to Quality Student Experiences

As noted previously, 44% of schools reported that the absence of a designated person to coordinate ELOs was a barrier to quality implementation. Table 5 compares the percentages of schools reporting high-quality implementation based on whether the school has a designated ELO coordinator or not. Overall, survey results strengthen the finding that a designated ELO coordinator influences implementation quality, at the district/school and student-level.

Table 5. Implementation of Student-Level High-Quality Indicators by ELO Coordinator Designation Across a Sample of New Hampshire High Schools (N=45)

High-Quality Student-Level ELO Implementation Indicator	Designated ELO Coordinator (n=27)		Not Designated (n=18)
	Primary role (n=14)	*Not primary role (n=13)*	
Student participate in creating their personalized learning plans (Percent of schools that offer personalized learning plans)	50%	69%	63%
ELOs include four components of rigorous ELO (research, reflection, product, and presentation), and students are assessed for each (Percent of schools that "always" or "often" assess all four components of ELOs)	64%	54%	22%
Students earn ELO credits that count for core and elective credits (Percent of schools that permit students to earn core and elective credits through ELOs)	79%	69%	44%
ELO participants reflect the diversity of the school's entire student population in terms of race/ethnicity, socioeconomic status, academic performance, and behavior (Percent of respondents that feel all student groups benefit "moderately" or "very" from ELO participation)	79%	54%	50%

Notable Findings:

- A greater percentage of schools with a designated ELO coordinator reported high-quality student-level ELO implementation than schools without a designated ELO coordinator—with the exception of one indicator: offering personalized learning plans.
- Sixty-four percent of schools with a designated ELO coordinator (either primary or not primary) reported that they "always or often" assess all four components of rigorous ELOs, compared to only 22% of schools without a designated coordinator.
- Schools with designated ELO coordinators also were much more likely than schools without designated coordinators to report that their ELO programs permit students to earn both core and elective credits, and that ELOs serve a representative sample of the school's population.

Summary: Context and Quality of ELO Implementation across New Hampshire High Schools

The presence of a designated ELO coordinator, particularly a staff member serving as an ELO coordinator as their primary role, appears to be a driver of quality ELO implementation. This finding is consistent with survey responses that commonly mention a "lack of ELO coordinator" as the biggest challenge to high-quality implementation.

III. PREDICTORS OF ELO PARTICIPATION

This section explores how student participation in ELOs is influenced by the presence of high-quality implementation indicators as well as individual student factors. We examined, in particular, two different measures of ELO participation:

1. Whether or not a student had taken a school-facilitated ELO in 2014-2015; and
2. The total number of school-facilitated ELOs taken by a student in 2014-2015.

More details about the analysis are provided in the methodological note below.

Methodological Note - ELO Implementation Analysis

The analyses presented in this section explore relationships between ELO quality indicators and student participation in school-facilitated ELOs.[7] Two indicators of student-level participation are used as dependent variables: whether a student completed one or more school-facilitated ELOs in 2014-2015 and the number of school-facilitated ELOs a student completed in 2014-2015. All seven school-level ELO quality indicators were assessed: administrator commitment, allocation of ELO funding, presence of a paid ELO position, active membership in statewide ELO group, teacher commitment, presence of multiple types of ELOs, and active relationships with community partners.

We used a multilevel linear model, or a multilevel logit model, to account for the nested nature of students within schools. The logit model was used when the outcome variable was a binary (yes/no) ELO participation. The linear model was used when the outcome variable was continuous ELO participation, i.e. the number of school-facilitated ELOs a student completed. Two levels of controls were included: a set of student-specific variables (level 1) and a single school-wide control (level 2). Included in level 1 controls are the number ELOs a student took during the 2013-2014 school year (school-facilitated or virtual), 8th-grade combined NECAP[8] score, race/ethnicity, gender, free and reduced-price lunch eligibility, English proficiency and special education status, and grade level. Whether a school recognized any form of virtual ELO was included as a school-level control.

Our analysis included all students enrolled in the sub-sample of 22 high schools that each provided two years of ELO participation data, including 10th, 11th, and 12th graders who had taken ELOs in the 2014-2015 school year and those who did not, for a total sample size of 12,195. We did not include 9th graders in the study sample because most study schools do not recommend 9th graders to take ELOs. There are no missing data on the dependent variables. We addressed issues with missing data on independent variables using mean substitution (and a dummy variable to note when a case had mean substitution). Results of our analyses are presented in Appendix C.

Finally, to examine whether the effects of ELO quality indictors on student participation varied by at-risk status, we replicated our ELO participation analysis for two different underserved student populations: economically disadvantaged students (i.e., those eligible for free or reduced-price lunch in 2014-2015), and low-achieving students (i.e., those who scored in the lowest quartile of combined NECAP score in 8th grade).

A. The Impact of High-Quality Implementation on ELO Participation

This section examines the district and school-level quality indicators that predict participation in ELOs. Using survey responses from the ELO coordinator survey and ELO participation data, we constructed seven discrete indices to measure the following high-quality implementation indicators introduced in our conceptual framework:

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[7] We define "school-based ELOs" as those that were offered or managed by participating schools, distinguishing them from "virtual ELOs" which were offered through New Hampshire's Virtual Learning Academy Charter School and are discussed later in this study.

[8] New England Common Assessment Program (NECAP) are a series of reading, writing, mathematics and science achievement tests, administered annually, which were developed in collaboration with the Rhode Island and New Hampshire departments of education. The NECAP tests measure students' academic knowledge and skills relative to the Grade Expectations for Vermont's Framework of Standards and Learning Opportunities. Student scores are reported at four levels of academic achievement; Proficient with Distinction, Proficient, Partially Proficient and Substantially Below Proficient. (http://education.vermont.gov/assessment/necap)

1. School administrator who demonstrates commitment to the ELO initiative
2. Funding allocated to ELO
3. Designated ELO coordinator as a paid position
4. Active membership in ELON
5. Highly qualified teachers from all disciplines trained and willing to sponsor an ELO
6. Multiple types of ELO available
7. Active relationships with community partners

We included each of these indices in a multilevel model to explore whether any are associated with student participation in ELOs when other school-level and student-level factors are held constant. The results of the analyses are summarized in Table 6.

In sum, we found that three of seven quality implementation indicators were significantly associated with student participation in ELOs, even after we controlled for student background and performance. These findings suggest that some aspects of ELO program quality may influence student involvement.

Table 6. Correlation Between High-Quality ELO Implementation and Student Participation During the 2014-2015 Academic Year Across a Sub-sample of New Hampshire High Schools (n=22)

	Participation in ELOs	Number ELOs Taken
School administrator who demonstrates commitment to the ELO initiative	N.S.	N.S.
Funding allocated to ELO	N.S.	N.S.
Designated ELO coordinator as a paid position	N.S.	N.S.
Active membership in ELON	+	N.S.
Highly qualified teachers from all disciplines trained and willing to sponsor an ELO	N.S.	N.S.
Multiple types of ELO available	-	N.S.
Active relationships with community partners	+	+

Note: A "+/-" symbol indicates a positive or negative correlation between the indicator in the first column and each measure of ELO participation. "N.S." indicates no significant correlation between the two.

Notable findings:

- Students who attend schools with an ELO coordinator who is actively involved in the statewide ELON are *significantly more likely* to participate in a school-facilitated ELOs than students who attend schools without an ELO coordinator who is involved in the statewide network.
- Students who attend schools that have established active community partner relationships are *significantly more likely* to participate in school-facilitated ELOs, and on average take more school-facilitated ELOs than students who attend schools without established community relationships.

- Offering multiple types of ELOs was found to be negatively associated with participation. One explanation for this finding may be that schools with a more targeted approach to ELOs offer fewer overall options. A more defined program, thus, could have a more positive impact on student participation than to a loosely defined program that offers multiple ELO types and formats.

B. The Impact of Student-Level Factors on ELO Participation

While school-level implementation factors are significantly related to students' likelihood of participation, we also found that student-level characteristics explain much of the variation in ELO participation. Table 7 reports the relationship between a comprehensive set of student-level factors and ELO participation.

Table 7. Correlation Between Student-Level Factors and ELO Participation During the 2014-2015 Academic Year Across a Sub-sample of New Hampshire High Schools (n=22)

	Participation in ELOs	Number ELOs Taken
Previous Exposure to ELOs		
Number of ELOs taken during 2013-2014	+	+
Academic Achievement		
8th grade composite NECAP score	+	+
Demographic Characteristics		
Female	+	+
Free/reduced price lunch recipient	N.S	N.S.
Limited English proficiency	+	+
Special education	+	+
Hispanic	N.S.	N.S.
Black	N.S.	+
Asian	+	N.S.
Native American/Alaskan or Pacific Islander	N.S.	+
Multi-racial	N.S.	N.S.
Grade Level		
Grade 11	+	+
Grade 12	+	+

Note: A "+/-" symbol indicates a positive or negative correlation between the indicator in the first column and each measure of ELO participation. "N.S." indicates no significant correlation between the two.

Notable findings:

- Students' prior academic experiences (having taken an ELO and 8th-grade test performance) were positively related to both measures of ELO participation. In addition, students in higher grades were significantly more likely to participate in school-facilitated ELOs.
- Students with special learning needs (limited English proficiency or special education) were also significantly more likely to participate in school-facilitated ELOs.
- Female students showed a significantly greater likelihood of participation in school-facilitated ELOs than male students across both measures of participation.
- The influence of a student's race/ethnicity on ELO participation was inconsistent across the two measures. Although Asian students were significantly more likely to participate in ELOs, the number of school-facilitated ELOs taken by Asian students was not significantly different from the white comparison group. In contrast, Black and Native American/Alaskan or Pacific Islander students showed no greater likelihood of participating in school-facilitated ELOs, but they did take a significantly greater number of ELOs when compared to white students.

IV. DESCRIPTIVE PROFILE OF SCHOOLS, IMPLEMENTATION, AND PARTICIPANTS

In this section, we take a deeper look at the 22 schools that formed our sample for deeper analysis.

Study School Sample

This study places special emphasis on evaluating the impact of ELOs on students, underserved learners in particular. For that reason, we sought high schools for our study sample that met the following criteria:

1. in districts with less than 80% white students;
2. more than 30% of their student population eligible for free and reduced-price lunch; and
3. more than 2% of the student population are English language learners (ELL).[9]

[9] These percentages are all higher than the state averages.

Overall, we recruited a total of 22 high schools that offered ELOs in the 2013-2014 and 2014-2015 academic years; 14 met at least one of these criteria.[10] Table 8 compares important characteristics of the 18 districts that house our 22 study schools with New Hampshire districts as whole.

Table 8. Key Characteristics of Sub-sample of New Hampshire High Districts Compared to all New Hampshire School Districts in 2014 – 2015

Program Settings	All NH Districts (n=168)1	ELO Study districts (n=18)2
Number of high schools	93	22
High school enrollment (October 1, 2014)	58,158	17,098
Percent students of color (district-level)[3]	12.65%	22.97%
Percent free/reduced-price lunch eligible	24.84%	32.08%
Child poverty rate[4]	11.15%	15.39%
Unemployment rate[4]	6.47%	7.03%
Adults 25 & older with high school diploma[4]	92.01%	90.04%
Adults 25 & older with Bachelor's degree[4]	34.37%	32.86%

Notes:

[1] Unified and elementary districts; due to overlapping administrative boundaries, this is the most comprehensive non-duplicated count of NH districts.

[2] Schools with two years of data and completed survey data.

[3] Source: New Hampshire Department of Education, 2015. Attendance and Enrollment Report. http://www.education.nh.gov/data/attendance.htm

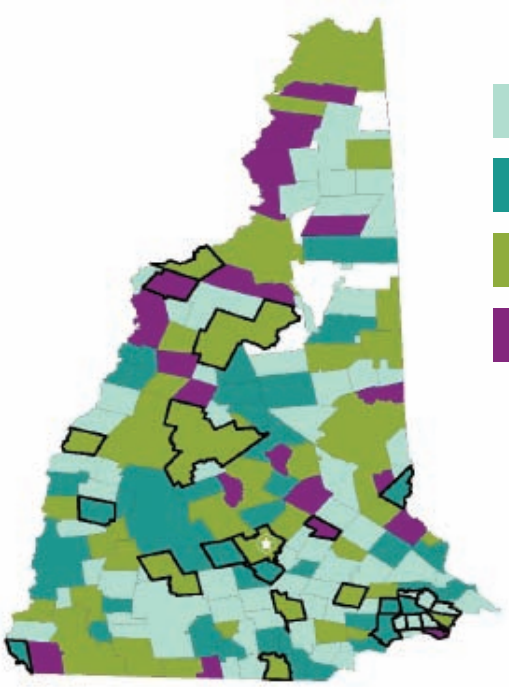
[4] Source: U.S. Census Bureau; American Community Survey, 2010-2014, Detailed Tables. Generated using American FactFinder for each district's catchment area.

According to October 1, 2014 enrollment figures, the study districts serve over 17,000 students, or about 29% of New Hampshire's public high school students. When viewed in the aggregate, our sample of districts includes disproportionately higher representation of students who are economically disadvantaged and who are racial/ethnic minorities. In addition, the aggregate child poverty rate in the study districts is substantially higher than the statewide rate.

Figure 2 presents child poverty rates across all 168 unified and elementary school districts of New Hampshire, with the ELO study school districts outlined in bold. Our study districts reflect a range of geographic and socio-economic diversity but overrepresent districts in the third and highest poverty quartiles.

10 All New Hampshire public high schools were invited to participate in the study via a letter to the principal. However, we focused additional recruitment efforts (i.e., emails and phone calls) on schools that met the criteria for underserved learners.

Figure 2. New Hampshire Child Poverty Rates by School District, with Study Districts Outlined in Bold



Lowest Quartile (0.00%-4.03%)

Second Quartile (4.04%-10.94%)

Third Quartile (10.95%-22.25%)

Highest Quartile (22.26%-41.46%)

Data Source: U.S. Census Bureau; American Community Survey, 2010-2014, Detailed Tables. Generated using American FactFinder.

Note: White areas include state parks and/or sections with no data.

ELO Implementation Across Study Schools

Types of ELOs: School-Facilitated vs Virtual

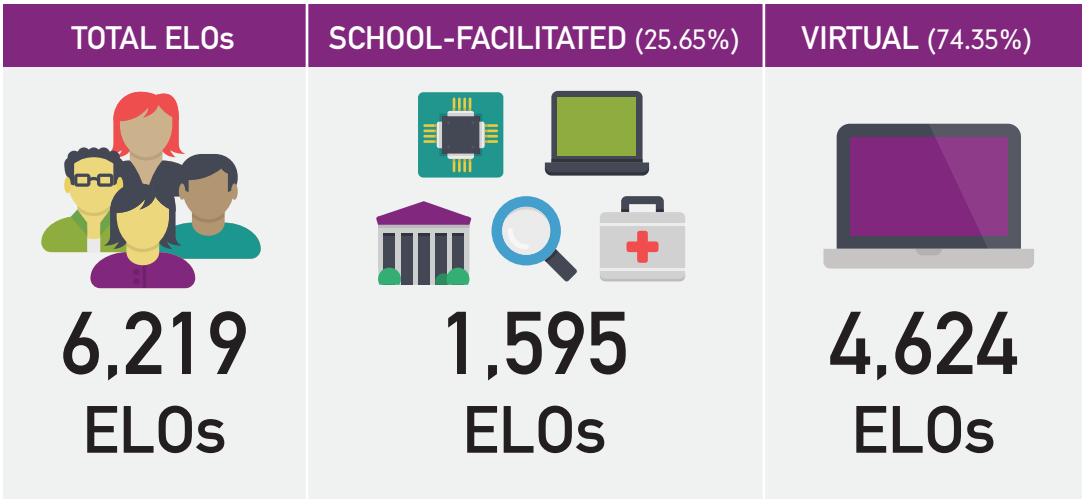
In this part of the analysis, we refer to two distinct categories of ELOs:

School-facilitated: ELOs that were offered or managed at participating schools.

Virtual: ELOs content provided by New Hampshire's Virtual Learning Academy Charter School.

Figure 3 displays the proportion of ELOs completed by study sample schools during 2014-2015 that were school-facilitated or virtual.

Figure 3. Total ELOs Completed Across a Sub-sample of New Hampshire Schools (n=22) in 2014-2015, School-facilitated and Virtual



As shown in Figure 3, there were almost three times as many virtual ELO courses completed in 2014-2015 than school-facilitated ELOs.

ELO Content: Comparing School-facilitated and Virtual ELOs

The school-facilitated and virtual ELOs completed in 2014-2015 covered 23 different subject areas. (All ELOs were assigned a subject code using subject area classifications provided by the Institute of Education Sciences.) Table 9 shows the proportion of ELOs that were completed for 10 of these subject areas; and the remaining 13 subject areas are reported in aggregate as "other."

Table 9. Subjects Areas for School-facilitated ELOs (n=1,591) and Virtual ELOs (n=4,624) Completed Across a Sub-sample of New Hampshire Schools (n=22) in 2014-2015, by IES Subject Classification

	School-facilitated	Virtual
English Language and Literature	10	12
Life and Physical Sciences	6	12
Mathematics	3	20
Social Sciences and History	9	22
Physical, Health, and Safety Education	11	14
Foreign Language and Literature	2	9
Fine and Performing Arts	8	3
Health Care Sciences	5	0
Hospitality and Tourism	5	0
Public, Protective, and Government Services	3	2
Other	38	6

Notable findings:

- School-facilitated ELOs covered many different subject areas, reflective of the personalized nature of these types of courses. The highest percent of school-facilitated ELOs completed in any given subject area was 11% in the area of physical education, health, and safety education.
- In contrast, most virtual ELOs (80%) were completed in one of five subject areas: social science and history, mathematics, English language and literature, life and physical sciences, and physical education, health, and safety education.

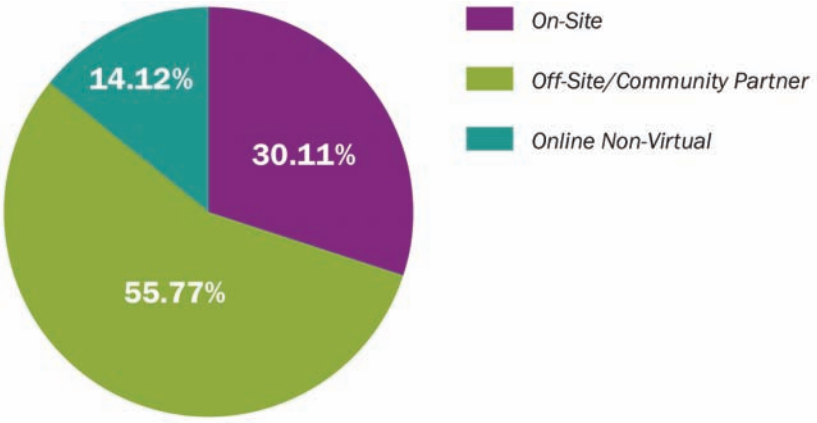
Implementation Quality of School-facilitated ELOs: Multiple Formats and Types of Credit

ELOs vary in format as well as subject area. Offering multiple types of ELO formats is considered an indicator of high-quality implementation because such variation expands course offerings, satisfies students' personalized learning goals, and provides flexible options for credit accumulation beyond traditional seat time. While 100% of virtual ELOs were completed online, the format of school-facilitated ELOs varied. We examined three general formats types:

- **On-site:** Advanced language courses, independent research projects, career exploration, and physical education electives completed at the student's school during or after school hours.
- **Off-site:** Work/study done with local entities such as non-profits, restaurants or other businesses, and universities, often referred to as community-partner ELOs.
- **Online:** Courses completed in an online format but not through the Virtual Learning Academy Charter School.

Another indicator of quality implementation is that students who complete ELOs are able to earn credits (both core and elective) that count towards graduation. In 2014-2015, students received either elective or core credits for 1,595 school-facilitated ELOs completed across 22 study schools. Figure 4 shows the ELOs completed by format and type of credit.

Figure 4. Total School-facilitated ELOs Completed Across a Sub-sample of New Hampshire Schools (n=22) in 2014-2015 by Format and Credit Type



	School-facilitated ELO Format			Credit Type	
	On-Site	Off-Site	Online (Non-VLACs)	Core	Elective
Total School-facilitated ELOs	501	928	235	420	1,174
Percent School-facilitated	30.11%	55.77%	14.12%	26.35%	73.65%

Notable findings:

- Off-site ELOs with a community partner were the most common format of ELOs across sampled schools in 2014-2015.
- Many more ELOS were completed for elective credit than for core credit.

Off-site ELOS accounted for more than half of the school-facilitated ELOs completed in 2014-2015. Local non-profits, restaurants, universities, and other businesses partnered with study schools to offering an array of learning opportunities outside the classroom. Table 10 shows the most common industries for ELOs completed in 2014-2015.[11]

[11] In order to analyze patterns across schools, each community partner was assigned an industry code using the North American Industry Classification System. The industries reported in Table 10 correspond to categories designated in the North American Industry Classification System.

Table 10. Percentage of School-facilitated ELOs Completed Off-Site Across a Sub-sample of New Hampshire Schools (n=22) in 2014-2015 (n=1,017), by Community Partner Industry Category

	School-facilitated ELOs Completed Off-site
Educational services	42%
Health care and social assistance	15%
Arts, entertainment, and recreation	16%
Accommodation and food services	6%
Public administration/government	4%
Professional, scientific, and technical	4%
Agriculture, forestry, fishing, and hunting	3%
Other	10%

Notable findings:

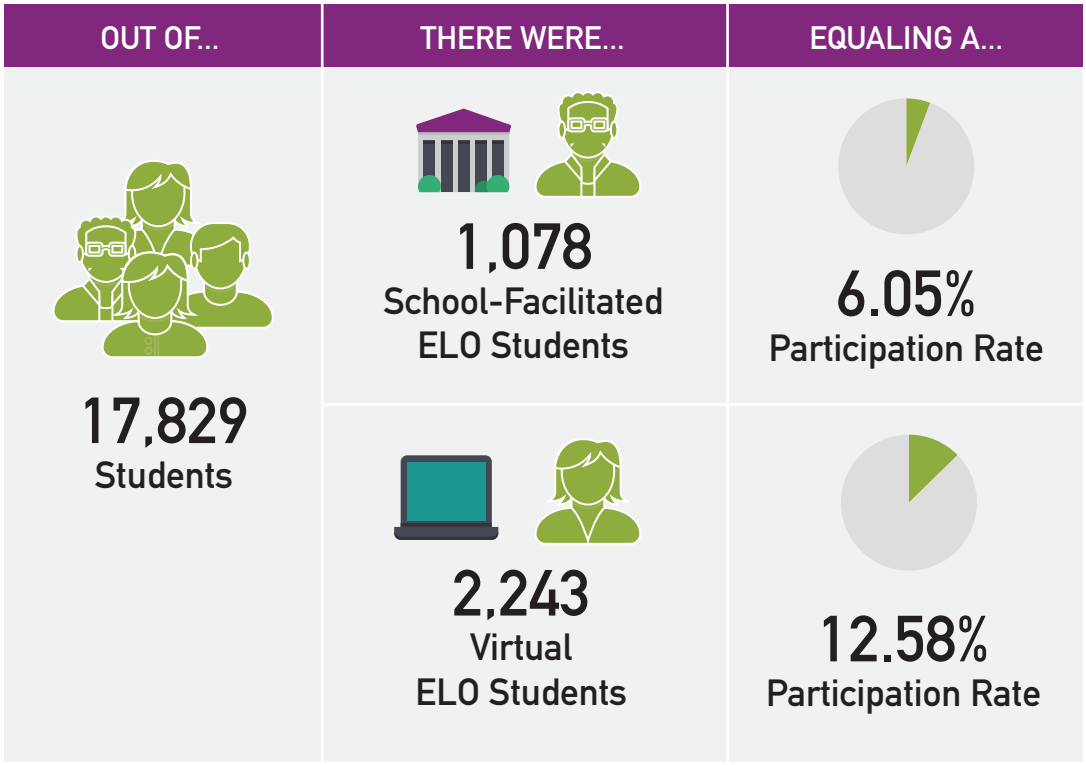
Most off-site ELOs (79%) were clustered within four industries:

- *Educational services* organizations, such as universities, elementary and middle schools, alternative education centers, and preschools, were the most common ELO-sponsoring partners, comprising 42% of all off-site ELOs.
- *Arts, entertainment, and recreation* organizations, such as the YMCA, local dance studios, and radio stations provided 16% of all off-site ELOs.
- Organizations in the *health care/social assistance* industry, such as nursing homes, social service agencies, and ambulance services, made up 15% of all off-site ELOs.
- *Accommodation and food service* organizations, such as restaurants, cafes, bakeries, and supermarkets, made up another 6% of off-site ELOs in 2014-2015.

Descriptive Profile of ELO Participants in 2014-2015

Nearly 18,000 students across a sub-sample of New Hampshire high schools (n=22) participated in at least one ELO during the 2014-2015 academic year. In this section of the report, we describe those students' characteristics.

Figure 5. ELO Participants and ELO Participation Rates a Sub-sample of New Hampshire Schools (n=22) in 2014-2015, School-facilitated and Virtual



Demographic Characteristics of Students

New Hampshire's ELO initiative was designed in part to meet the educational needs of underserved students who may struggle to acquire knowledge and skills through traditional modes of learning. Table 11 provides a comparison of traditionally underserved student populations enrolled in study schools and their ELO participation.

Table 11. Students Enrolled in a Sub-sample of New Hampshire Schools (n=22) by Underserved Sub-Groups for all ELO Participation Types, 2014-2015

	All Students	School-facilitated ELO Participants	Virtual ELO Particpants	Non-ELO Participants
Race/Ethnicity				
White (non-Hispanic)	79.91%	79.96%	83.24%	79.40%
Asian (non-Hispanic)	4.45%	5.75%	7.85%	3.89%
Black (non-Hispanic)	4.26%	4.55%	2.27%	4.52%
Hispanic	9.55%	7.14%	4.19%	10.48%
Other Race/Ethnicity	1.83%	2.60%	2.45%	1.70%
Economically Disadvantaged				
Eligible for free or reduced-price lunch	30.66%	29.96%	20.42%	32.21%
Special Learning Needs				
Special education	15.62%	15.49%	6.51%	16.88%
Limited English proficiency	4.13%	5.94%	0.58%	4.5%
Total Sample Size	17,829	1,078	2,243	14,721

Notable findings:

- *Race/ethnicity:* Proportionately fewer Black and Hispanic students participated in virtual ELOs, while the percentages of White and Asian students participating in virtual ELOs were higher than in the overall study population. Hispanic students were also underrepresented among school-facilitated ELO participants.
- *Economic disadvantage*: Students eligible for free or reduced-price lunch were also underrepresented among virtual ELO participants, but their participation in school-facilitated ELOs was comparable to their representation in the overall study population.
- *Special education and limited English proficiency:* The representations of special education and limited English proficient students were much lower in the virtual ELO participant sample than in the school-facilitated ELO sample and overall student sample.

Academic Characteristics of Students Participating in ELOs

The demographic characteristics of virtual ELO participants suggest that virtual ELOs are being utilized primarily by student subgroups who typically succeed in a traditional school environment. However, the background characteristics of school-facilitated ELO students are much more similar to the student population enrolled in the study schools. Analyses of the academic achievement of participants and non-participants affirms this pattern.

Table 12 compares ELO participants to non-participants according to key academic characteristics: proficiency on the 8th grade NECAP state assessment, presence of an early warning indicator,[12] and current grade level.

Table 12. Overview of 2014-2015 ELO Participants by Academic Characteristics across a Sub-sample of New Hampshire Schools (n=22)

	All students	School-facilitated ELO Participants	Virtual ELO Participants	Non-ELO Participants
8th grade NECAP: *percent scoring proficient or better*				
Math	61.66%	64.91%	75.10%	59.61%
Reading	76.15%	74.58%	88.55%	74.49%
Writing	60.93%	65.02%	75.52%	58.62%
AP Enrollment				
Taking any AP courses	1.08%	4.27%	1.20%	0.86%
Early Warning Indicator (EWI): *suspensions, off-track credit accumulation, or attendance below 80%*				
Exhibiting at least one EWI	54.09%	44.50%	47.17%	55.61%
Grade level				
Percent in 9th grade	26.50%	8.53%	17.03%	28.99%
Percent in 10th grade	25.58%	16.14%	26.44%	25.94%
Percent in 11th grade	23.87%	28.01%	26.04%	23.29%
Percent in 12th grade	24.05%	47.31%	30.49%	21.77%
Total Sample Size	17,829	1,078	2,243	14,721

[12] Early warning indicators are research-based predictors of a student's likelihood of dropping out.

Notable findings:

- Greater proportions of virtual ELO students scored proficient or better on all three 8th grade NECAPs when compared to students who took school-facilitated ELOs and non-ELO students.
- Students with at least one early warning indicator were underrepresented among ELO participants of both types.
- Seniors and juniors account for 75% of school-facilitated ELO participants, and 57% of virtual ELO students.

Summary: Descriptive Profile of Study Schools, Implementation, and Participants

Characteristics of ELOs Implementation Across Study Schools

Study schools provide school-facilitated ELOs in multiple formats (on-site, off-site, and online) as well as virtual ELOs offered through the Virtual Learning Academy Charter School. School-facilitated ELOS span a wide range of subject areas and industries, suggesting that ELOs are effectively being used to expand course offerings, satisfy students' personalized learning goals, and provide flexible options for credit accumulation beyond seat time.

Characteristics of ELO Participants Across Study Schools

In our sample of 22 high schools, traditionally underserved students participated in virtual ELOs at proportionately lower levels than non-disadvantaged students. School-facilitated ELOs serve relatively higher proportions of traditionally underserved students than virtual ELOs. This pattern is consistent when examined via both demographic characteristics and indicators of prior academic achievement.

V. THE IMPACT OF ELOS ON STUDENT OUTCOMES

This section examines the effects of ELO participation on interim and longer-term student outcomes defined in our conceptual framework (see Figure 1).[13] Findings are presented for the full sample and for two sub-samples of underserved students. The specific variables used to measure each outcome are summarized in Table 13.

[13] The short and long-term outcomes are indicated in bold on the Conceptual Framework for New Hampshire ELO presented in Section II.

Table 13. Outcomes from Conceptual Framework and Variables Used for Measurement

Outcome Category from ELO Conceptual Framework	Measured as
Interim Outcomes	
Student engagement/behavior	• Average daily attendance (ADA)[3] • At least one out of school suspension (OSS)
Academic commitment	• Total credit accumulation • "On-track" to graduate credit accumulation
Postsecondary aspirations	• Taking PSAT • Taking SAT
Longer-term Outcomes	
Academic mastery	• Graduating high school in 2014-2015
Postsecondary preparedness	• Composite SAT score (i.e. combined score for verbal, math, and writing sections) • College enrollment status

Two main sets of analyses were conducted for each of the six interim outcomes and three longer-term outcomes described in Table 13. We looked at:

1. the influence of participation in a school-facilitated ELO on each outcome; and
2. the influence of participation in a virtual ELO on each outcome.

For each analysis, we also conducted two separate sub-group analyses of at-risk students that examine the correlation between ELO participation and the outcomes of economically disadvantaged and academically low-performing students.

- We separated the analyses of school-facilitated and virtual ELOs for the following reasons:
- The quality of school-facilitated ELOs is related to school context, and so student outcomes from these ELOs can be associated with school-facilitated implementation factors. In contrast, the quality of virtual ELOs is not associated with school context.
- The number of virtual ELOs is much larger than the number of school-facilitated ELOs, and so any aggregate measure that combined the two types would be heavily biased towards virtual ELOs.

Methodological Note: Student Outcomes Analyses

The analyses presented in this section examine nine different outcome variables (i.e. dependent variables): average daily attendance, out-of-school suspensions, total number of credits taken, an on-track-to-graduate indicator, participation in the PSAT, participation in the SAT, composite SAT score, graduation, and college enrollment.

We utilized a multilevel linear model, or a multilevel logit model, to account for the nested nature of students within schools. A logit model was used with binary (yes/no) outcomes, such as taking the SAT or not, and the linear model was used with continuous variables, such as composite SAT or course credits. The effects of ELO participation on student outcomes were estimated controlling for various student-level (level 1) variables, including an 8th-grade combined NECAP score, race/ethnicity, gender, free and reduced-price lunch eligibility, English proficiency and special education status, and grade level. Following a random intercept model specification, our multilevel model allows each school to have its own intercept that represents the average student ELO participation at the school.

We recognize that ELO participants and non-participants are quite different in terms of both demographic and academic characteristics and, thus, differences in student outcomes may be due to selection bias. To address this issue and isolate the unique effect of ELO participation on student outcomes, we utilized a propensity score matching technique to identify comparison students (non-ELO participants) who are equivalent to ELO participants in terms of their underlying characteristics. The ELO participant and non-participant comparison groups were matched by the same level 1 variables listed above.

For each analysis, we looked at the outcomes of 11th and 12th graders who participated in ELO between 2013-2014 and 2014-2015 compared to outcomes of the matched students who had not participated in ELO. Before running the propensity analysis to identify matched comparisons, we dropped cases with missing data on the dependent variables and addressed issues with missing data on independent variables using mean substitution (and a dummy variable to note when a case had mean substitution). This led to an analytic sample that varied from just over 1,000 students for outcomes that only applied to 12th graders to about 2,000 students for outcomes that apply to both 11th and 12th graders.

Finally, to examine whether the effects of ELO participation varied by at-risk status, we replicated our analysis of the effects of taking an ELO for two different underserved student populations: economically disadvantaged (i.e., students eligible for free or reduced-price lunch in 2014-2015), and low-achieving (i.e., students who scored in the lowest quartile of combined NECAP score in 8th grade).

Results of our analyses are presented in Appendices E and F.

The Correlation Between ELO Participation and Interim Student Outcomes

This set of analyses examined whether 11th and 12th grade students who participated in an ELO (school-facilitated or virtual) at any time during the 2013-2014 or 2014-2015 academic years had significantly different interim outcomes when compared to a matched set of non-ELO participants in our study schools. To address the threat of selection bias, we utilized a propensity score matching technique to identify a statistically similar comparison group. In addition, we included statistical controls for race/ethnicity, gender, free and reduced-price lunch eligibility, 8th-grade academic achievement, and special education and English proficiency status in our analyses.

Table 14 summarizes the results of these analyses for six measures of student engagement, academic commitment, and postsecondary aspirations.

Table 14. The Correlation Between Taking ELOs and Interim Outcomes of 11th and 12th Grade Student in Academic Year 2014-2015

		School-facilitated	Virtual
Student Engagement	Average daily attendance	N.S.	-
	One or more out-of-school suspensions	N.S.	N.S.
Academic Commitment	Credits earned	+	N.S.
	On-track to graduate high school	+	-
Postsecondary Aspirations	Taking the PSAT	+	N.S.
	Taking the SAT	+	+

Note: A "+/-" symbol indicates a positive/negative correlation between the student outcome and participation in a school-facilitated or virtual ELO. "N.S." indicates no significant correlation between the two.

Notable findings:

Overall, our findings suggest that even when controlling for demographic and academic characteristics, participation in school-facilitated ELOs has a strong, positive effect on several academic indicators. In contrast, the association between participation in virtual ELOs and interim outcomes were mixed.

Student Engagement

- There was no significant relationship between participation in school-facilitated ELOs and either measure of student engagement.
- Participation in a virtual ELO was negatively related to attendance and was not significantly related to the likelihood of receiving an out-of-school suspension.

Academic Commitment

- Participation in a school-facilitated ELOs was significantly and positively associated with credit accumulation. The average student who participated in at least one school-facilitated ELO had accumulated significantly more credits at the end of 2014-2015 than matched non-participant peers.
- Students who had participated in at least one school-facilitated ELO had a greater likelihood of being on-track to graduate at the end of 2014-2015 than matched non-participant students.
- In contrast, students who participated in at least one virtual ELO were significantly less likely to be on-track to graduate than matched peers who did not take a virtual ELO.

Postsecondary Aspirations

- Participation in a school-facilitated ELO was positively and significantly correlated with taking the PSAT and SAT exams, suggesting that students who take ELOs are more likely to have and act upon postsecondary aspirations than their non-ELO peers.
- Participation in a virtual ELO was positively and significantly related to taking the SAT but was not significantly associated with taking the PSAT.

The Correlation between ELO Participation and the Interim Outcomes of Underserved Students

As noted above, one of the primary purposes of New Hampshire's ELO initiative is to improve the outcomes of all students, and particularly underserved learners, by offering non-traditional ways to engage with academic content. Extant research on the impact of ELOs on underserved students in New Hampshire has been limited to a pilot study of four high schools[14] and has not considered the impact of ELO participation on students' high school performance or postsecondary preparedness.[15]

To address this gap in the literature, we examined the unique effect of ELO participation on outcomes for two sub-samples of underserved ELO students:

- Economically disadvantaged:[16] Eligible for free or reduced-price lunch in 2013-2014; and
- Academically low-performing:[17] 8th-grade math NECAP score in the bottom quartile.

Table 15 summarizes the results of our analyses of interim student outcomes for economically disadvantaged and academically low-performing students.[18]

Table 15. The Relationship Between ELO Participation and 2014-2015 Interim Outcomes for two At-Risk Sub-Groups of 11th-12th Grade Students, Economically Disadvantaged and Academically Low Performing

		Economically Disadvantaged		Academically Low Achieving	
		School-facilitated	Virtual	School-facilitated	Virtual
Student Engagement	Average daily attendance	N.S.	-	N.S.	N.S.
	One or more out-of-school suspension	N.S.	N.S.	N.S.	-
Academic Commitment	Credits earned	N.S.	N.S.	+	N.S.
	On-track to graduate high school	+	N.S.	N.S.	N.S.
Postsecondary Aspirations	Taking the PSAT	N.S.	N.S.	N.S.	N.S.
	Taking the SAT	+	+	N.S.	N.S.

Note: A "+/-" symbol indicates a positive/negative correlation between the student outcome and participation in a school-facilitated or virtual ELO. "N.S." indicates no significant correlation between the two and may be a due to the small sample size.

Notable findings:

- Among economically disadvantaged students, participation in school-facilitated ELOs was significantly and positively related to two important interim academic outcomes: likelihood of being on track to graduate and the likelihood of taking the SAT exam.

[14] Steven E. & Zuliani, I. (2011). The New Hampshire Extended Learning Opportunities Evaluation: Final Report of Evaluation Findings. Hadley, MA: UMass Donahue Institute.

[15] Barrick, D. & Norton, S. (2012). Student-Centered Learning in New Hampshire: An Overview and Analysis. Concord, NH: New Hampshire Center for Public Policy Analysis.

[16] Analyses of economically disadvantaged students included statistical controls for race/ethnicity, gender, 8th-grade academic achievement in math, and special education and English proficiency status.

[17] Analyses of academically low performing students included statistical controls for race/ethnicity, gender, free and reduced-price lunch eligibility, and special education and English proficiency status.

- The relationship between virtual ELO participation and interim outcomes was mixed for economically disadvantage students: participation was negatively associated with attendance and positively associated with the likelihood of taking the SAT.
- Among academically low-achieving students, participation in a school-facilitated ELOs was positively associated with the number of credits accumulated.
- Academically low-achieving students who participated in at least one virtual ELO were significantly less likely to have received an out-of-school suspension than matched non-participant peers.

The Correlation between ELO Participation and Longer-Term Student Outcomes

This set of analyses examined whether 12th-grade students who participated in an ELO (school-facilitated or virtual) at any time during the 2013-2014 or 2014-2015 academic years had significantly different longer-term outcomes when compared to a matched set of non-ELO participants in our study schools. Table 16 summarizes the results for three longer-term measures of academic mastery and postsecondary preparedness.

Table 16. The Relationship Between ELO Participation and 2014-2015 Long-Term Outcomes for 12th-Grade Students

		School-facilitated	Virtual
Academic Mastery	High school graduation	N.S.	-
Postsecondary Preparedness	Composite SAT score	+	+
	College enrollment	+	N.S.

Note: A "+/-" symbol indicates a positive/negative correlation between the student outcome and participation in a school-facilitated or virtual ELO. "N.S." indicates no significant correlation between the two.

Notable findings:

Overall, our findings suggest that, even when controlling for demographic and academic characteristics, participation in school-facilitated ELOs has a strong, positive effect on both measures of postsecondary preparedness. In contrast, the association between participation in virtual ELOs and longer-term outcomes were mixed.

Academic Mastery

- School-facilitated ELO participation had no significant effect on the likelihood of high school graduation; however, 12th-grade students who had participated in at least one virtual ELO were less likely to graduate in 2014-2015.

Postsecondary Preparedness

- Participation in a school-facilitated ELO was positively and significantly correlated with students' composite SAT score; the average 12th-grade student who participated in at least one school-facilitated ELO earned a significantly higher score on the SAT than matched non-participant peers.
- Participation in a virtual ELO was also positively and significantly associated with composite SAT score.
- Among students who graduated in 2015, those who had participated in at least one school-facilitated ELO were significantly more likely to be enrolled in college six months later.

The Correlation Between ELO Participation and Longer-Term Outcomes of Underserved Students

Table 17 shows the results of our analyses examining the relationship between ELO participation and each of the three longer-term student outcomes for economically disadvantaged and academically low-performing 12th graders.

Table 17. The Relationship Between ELO Participation and Longer-Term Outcomes for two At-Risk Sub-Groups of 12th Grade Students in 2014-2015

		Economically Disadvantaged		Academically Low Performing	
		School-facilitated	Virtual	School-facilitated	Virtual
Academic Mastery	High school graduation	N.S.	N.S.	N.S.	-
Postsecondary Preparedness	Composite SAT score	+	+	+	N.S.
	College enrollment	N.S.	N.S.	N.S.	+

Note: A "+/-" symbol indicates a positive/negative correlation between the student outcome and participation in a school-facilitated or virtual ELO. "N.S." indicates no significant correlation between the two.

Notable findings:

- Among economically disadvantaged students, those who participated in at least one school-facilitated or virtual ELO earned higher composite scores on the SAT than similar non-ELO participants.
- Among academically low-performing students, only school-facilitated ELO participation was positively and significantly related to higher SAT scores.
- Academically low-performing students who participated in virtual ELOs were significantly less likely to graduate from high school when compared to their non-participant peers.
- Among academically low-performing students who graduated from high school in 2015, those who had participated in a virtual ELO were significantly more likely to be enrolled in college six months later.

Summary of the Impact of ELOs on Student Outcomes

For All Students, ELOs Have a Positive Effect on:

- **Academic commitment.** Students participating in at least one school-facilitated ELO were more likely than non-ELO takers to accumulate credits and be on track to graduate.
- **Postsecondary aspirations.** Students taking school-facilitated ELOs were more likely to take the PSAT, and both school-facilitated and virtual ELO participants were more likely to take the SAT compared to non-ELO taking students.

For 12th Grade Students Only, ELOs Have a Positive Effect on:

- **Postsecondary preparedness.** Twelfth-grade students who participated in school-facilitated ELOs scored higher on the SAT and were more likely to enroll in college than non-ELO takers.

For Economically Disadvantaged and Academic Low Performing Students, ELOs have a positive Effect on:

- **Academic commitment.** Economically disadvantaged students participating in school-facilitated ELOs were more likely than their peers to be on-track to graduate high school, and academically low-performing students participating in school-facilitated ELOs accumulated more credits than their non-ELO taking peers.
- **Postsecondary aspirations.** Economically disadvantaged students participating in school-facilitated and virtual ELOs were more likely to take the SAT compared to their non-ELO taking peers.

For 12th-Grade Economically Disadvantaged and Academic Low-Performing Students, ELOs have a positive Effect on:

- **Postsecondary preparedness.** Economically disadvantaged and academically low-performing students who participated in ELOs scored higher on the SAT than their non-ELO taking peers, and low-performing students who participated in a virtual ELO were more likely to be enrolled in college six months after graduation.

CONCLUSION

Our two-year study of New Hampshire ELOs yielded the following takeaways:

Key Finding: New Hampshire has succeeded in implementing ELOs broadly. The majority of schools surveyed indicated robust implementation of ELOs based on seven indicators of high-quality implementation as defined by our research-derived ELO conceptual framework. In addition, the breadth of ELOs completed at the 22 study schools suggest that students are using ELOS to learn about, and demonstrate, mastery of competencies across a vast array of subjects; they are also gaining exposure to a wide variety of industries.

Key Finding: Student participation levels in school-facilitated ELOs reflect the full diversity of students enrolled in New Hampshire high schools, including traditionally underserved students. Student participation in school-facilitated ELOs is proportionate to the entire student population, both in terms of demographics and academic characteristics. In addition, the proportions of traditionally underserved students (students underrepresented by race/ethnicity, economically disadvantaged, and with special learning needs) participating in school-facilitated ELOs are equivalent to the full student population.

Key Finding: The presence of designated ELO coordinators is critically important to quality implementation. Schools with designated ELO coordinators (and especially those with coordinators who focus primarily on ELOs) were more likely to report robust implementation of ELOs across each indicator. In addition, schools with ELO coordinators were much more likely to report: active involvement in the statewide ELON, and active relationships with community partners—which both had a significant and positive effect on student participation in ELOs.

Key Finding: School-facilitated ELOs have positive effects across a range of outcomes, including measures of students' academic commitment, postsecondary aspirations, and postsecondary preparedness. Students who participated in school-facilitated ELOs accumulated more credits and were more likely to be on track to graduate high school than non-ELO takers. School-facilitated ELO participants were also significantly more likely than similar non-participants to take the PSAT and the SAT exams, and they scored higher on the SAT than non-ELO peers. Finally, school-facilitated ELO participants were significantly more likely to be enrolled in college six months after graduating from high school.

Key Finding: Positive effects of school-facilitated ELO participation were also observed for students who were economically disadvantaged and academically low performing. Participation in school-facilitated ELOs was positively and significantly associated with the likelihood of being on track to graduate high school, taking the SAT, and having a higher SAT composite score for students eligible for free or reduced-price lunch. Among academically low-performing students (students who scored in the bottom quartile on their 8th-grade math NECAP), school-facilitated ELO participation was positively related to accumulating credits and a higher composite SAT score.

Key Finding: Participation in school-facilitated ELOs was consistently associated with a greater number of positive student outcomes than was virtual ELO participation. In contrast to the range of outcomes related to school-facilitated ELO participation, virtual ELO participation was positively associated with only one interim outcome (taking the SAT), and one longer term outcome (composite SAT score). For the underserved student subgroups, virtual ELOs were positively associated with fewer outcomes than school-facilitated ELOs. Virtual participants did have stronger outcomes than students who did not participate in any ELOs, however. Economically disadvantaged virtual ELO participants were more likely to take the SAT and scored higher on the SAT than non-ELO peers. In addition, among academically low-performing students, virtual ELO participants had a greater likelihood of enrolling in college six months after high school graduation than similar non-ELO students.

Further Research

While the findings outlined in our report are promising, our research is limited to two years of ELO implementation and participation data with 22 schools. Further research in New Hampshire as well as other states where ELOS have been implemented could build upon the current study by examining the following:

1. **The role of ELO coordinators.** What are ELO coordinators doing to ensure high quality implementation? In the absence of an ELO coordinator, how can schools promote student participation and quality implementation?

2. **The role of state support in scale up and sustainability.** Our ELO conceptual framework identifies state-level support as a pre-condition for high-quality ELO Implementation. Since New Hampshire's policy on ELO was adopted, the state has simultaneously continued to expand the implementation of competency-based education. How can states support ELOs within a statewide competency-based model?

3. **The effect of ELO quality on student outcomes.** Further research should also examine whether the quality of individual ELOs – measured by the presence and assessment of key components (research, reflection, product, and presentation) – impacts student outcomes.

4. **The role of community partnerships in ELO quality and effectiveness.** Lastly, our research suggests that the majority of school-facilitated ELOs include a community partner, and active relationships with community partners are a significant predictor for student participation. Future research should explore if particular community partner formats are more effective than other ELO formats. How do experiences with specific partners and industries influence student outcomes?

APPENDIX A.

Data Collection and Sampling Strategy

Data Collection

This study utilized data at three levels: first, data on student characteristics, including GPA and credit data; second, data regarding the ELO courses taken by students; and third, school-level ELO implementation data from a survey on ELOs across New Hampshire.

Twenty-two schools in partnership with the NHDOE submitted data on student characteristics and ELO participation. This data was submitted for the 2013-2014 and 2014-2015 academic years. An additional 45 schools provided survey data on ELO program implementation for the 2014-2015 academic year.

Student Characteristics and ELO Course Data

We acquired two years of student-level data from existing datasets kept by NHDOE, which were supplemented with aggregated data from school staff. NHDOE collects most of the student-level data used in this study, including demographics, suspensions, attendance, and standardized test scores (though these data, of course, originated in schools). Since schools are not required to submit GPA and credit accumulation data to NHDOE, schools generated these data for the study.

Data was collected for all students who attended a study school at any point during the 2013-2014 and 2014-2015 school years, regardless of whether or not they took an ELO.

The second level of data pertaining to ELO courses themselves included: subject matter, mode of instruction (e.g. online or with a community partner), number of credits earned, and length of course, among other course characteristics (see appendix A for data item definitions). Study school staff member, including guidance counselors, ELO coordinators, and principals, collected and submitted data for all ELOs that were organized at the school level. NHDOE provided data on virtual ELO courses taken through the Virtual Learning Academy Charter School (VLACS).

More detailed information was collected for school-facilitated (i.e., non-VLACS) courses; specifically, schools were able to provide longer course descriptions, the number of credits attempted (in addition to credits earned), and indicators for elective, core, and credit recovery courses. These three indicators were excluded from the VLACS data request, since classification decisions are made at the school level while VLACS data was provided at the state level. Obtaining supplemental information on virtual course indicators would have significantly increased the burden on participant schools.

In order to maintain data integrity and student anonymity, study schools submitted all data to NHDOE, which combined existing datasets with schools' additions before transmitting the final dataset.

During the data collection process, Hillsboro-Deering High School informed Research for Action staff that they did not conduct school-facilitated ELO courses. Course data for this school came entirely from VLACS sources.

School-Level ELO Implementation Data

Data on school-level ELO implementation was collected from a survey on ELOs in New Hampshire administered by Research for Action in the spring 2015. The survey instrument queried key school-level factors that influence the implementation of high-quality ELOs. In addition, the survey also captured information that related to RFA's prior work developing a conceptual framework for ELOs in New Hampshire.

Survey respondents were asked to provide information about ELOs from the 2014-2015 school year, so that implementation data would correspond to the same timeframe as the second year of ELO participation and student outcomes data submitted by schools.

Sampling Strategy

Study School Sampling Strategy

RFA constructed the sample of 22 schools used in this study through both general and targeted recruitment among the 91 high schools in New Hampshire. RFA's recruitment efforts began with an email invitation from NHDOE Deputy Commissioner Paul Leather to all high schools

in the state. Follow-up efforts included presentations at ELO coordinator meetings, and emails and phone calls to principals and school staff members. The three largest districts by total enrollment—Manchester, Nashua, and Concord—were specifically targeted for inclusion given their relatively large numbers of racial/ethnic minority students and English language learners. (Our analyses controlled for these and other demographic factors.)

Survey Sampling Strategy

RFA invited a sample of 87 ELO coordinators across high schools in New Hampshire to complete a survey on ELO implementation. To construct the sample, RFA used a pre-existing email distribution list developed by the ELON. For New Hampshire high schools not included on the distribution list, RFA scanned all remaining public schools in New Hampshire to identify the ELO coordinators or ELO point person from each.

ELO coordinators from 45 schools completed the survey, resulting in a 52% response rate. Additional emphasis was placed on encouraging schools in RFA's study sample (22 schools that submitted ELO participation and GPA and credit data in 2013-2014 and 2014-2015) to respond. RFA was able to collect survey data from 20 schools within our study sample.

APPENDIX B.

Data Element Definitions

Table B1. GPA/Credit Submission Data Definitions

	Student Level Data Items	Definition	Valid Values	Required Field
Student Information	SAUNbr	Three-digit school ID assigned by the NHDO	Three-digit SAU number (SAUNBR) must be numeric and cannot be blank. SAU number (SAUNBR) must be a valid SAU on file	Yes
	District Nbr	Three-digit district iID assigned by the NHDOE	Three-digit number	Yes
	School Nbr	Five-digit school ID assigned by the NHDOE	Five-digit number	Yes
	SASID	State-assigned student ID (SASID)	Must be a valid SASID (10 digits)	Yes
	DOB	Date of birth	MM/DD/YYYY, MM-DD-YYYY, MM/DD/YY	Yes
Credits/GPA	Credits earned (current year)	Total credits earned during the 2013-2014 school year	Numeric values	Yes
	Cumulative credits earned	Total credits accumulated after the 2013-2014 school year	Numeric values	Yes
	End-of-Year GPA	Grade point average for the current year	Numeric values	No
	Cumulative GPA	Cumulative grade point average for entire high school experience	Numeric values	Yes

Table B2. ELO Submission Data Definitions

	Student Level Data Items	Definition	Valid Values	Required Field
Student Information	SAUNbr	Three-digit school ID assigned by the NHDOE	Three-digit SAU number (SAUNBR) must be numeric and cannot be blank. SAU number (SAUNBR) must be a valid SAU on file	Yes
	District Nbr	Three-digit district ID assigned by the NHDOE	Three-digit number	Yes
	School Nbr	Five-digit school ID assigned by the NHDOE	Five-digit number	Yes
	SASID	State assigned student ID (SASID)	Must be a valid SASID (10 digits)	Yes
	DOB	Date of birth	MM/DD/YYYY, MM-DD-YYYY, MM/DD/YY	Yes
ELO	ELO Name	The descriptive name of the ELO agreed upon by the ELO coordinator and the student	Max 100 characters	Yes
	ELO Description	Provide a short description of the ELO	Max 500 characters	Yes
	Primary Subject Area (IES)	Valid NHDOE subject areas	Two-digit subject code 1-23 (refer to RFA handout)	Yes
	Secondary Subject Area 1 (NHDOE)	Valid NHDOE subject areas		No
	Secondary Subject Area 2 (NHDOE)	Valid NHDOE subject areas		No
	Community Partner/Mentor Component	What percent of the ELO is conducted with a community partner?	0%; 25%; 50%; 75%; 100%	Yes
	ELO Community Partner/ Mentor	Organization Supporting ELO Course	max 100 characters	No
	Community Partner Industry	Two-digit Industry code	Two-digit industry code (refer to RFA handout)	No
	Online Component	What % of the ELO is completed online?	0%; 25%; 50%; 75%; 100%	Yes
	Independent or School-facilitated Component	What % of the ELO was independent work?	0%; 25%; 50%; 75%; 100%	Yes
	Traditional coursework component	What % of the ELO is conducted in a traditional classroom?	0%; 25%; 50%; 75%; 100%	Yes
	Credit Bearing ELO	Does the student accumulate academic credit through the ELO?	Y/N	Yes
	ELO Credit Recovery	Is the ELO a credit recovery opportunity?	Y/N	Yes
	ELO Core Course	Does the ELO count as a core academic credit?	Y/N	Yes
	ELO Elective Course	Does the ELO count as an elective academic credit?	Y/N	Yes
	ELO Start Date	Start date for the ELO	mm/md/yyyy	Yes
	ELO Completion Date	End date for the ELO	MM/DD/YYYY (blank if incomplete)	Yes
Credits	ELO Credits Attempted	Number of credits student could have earned	decimal	Yes
	ELO Credits Earned	Number of credits student did earn	decimal	Yes

APPENDIX C.

Predictors of ELO Participation

Table C1: Student-Level Factors Affecting Likelihood of Taking One or More ELOs: A Multilevel Linear Regression

	Likelihood of Taking One or More School-facilitated ELOs		
	Whole population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Total number school-facilitated ELOs taken in previous year	0.703***	0.677***	0.702***
	(0.068)	(0.097)	(0.102)
Missing data for school-facilitated ELOs in previous year	-0.840***	-0.417	-0.837**
	(0.216)	(0.369)	(0.392)
Average score on 8th Grade NECAP exams	0.024***	0.012	-0.009
	(0.005)	(0.009)	(0.013)
Female	0.488***	0.648***	0.521***
	(0.076)	(0.146)	(0.151)
Eligible for free/reduced-price lunch	-0.081		0.114
	(0.094)		(0.162)
Limited English proficiency	0.822***	0.443*	0.610**
	(0.204)	(0.248)	(0.278)
Student in special education program	0.323***	0.152	0.286*
	(0.115)	(0.191)	(0.168)
Hispanic	-0.167	-0.026	-0.432*
	(0.158)	(0.220)	(0.256)
Black	0.263	0.581**	-0.066
	(0.193)	(0.245)	(0.311)
Asian	0.349**	0.849***	0.492
	(0.174)	(0.279)	(0.338)
American Indian or Alaska Native	0.435	0.233	0.901
	(0.435)	(0.789)	(0.638)
Multiracial	0.312	0.771	0.247
	(0.284)	(0.494)	(0.582)
Grade 11	0.654***	0.424**	0.392**
	(0.106)	(0.181)	(0.199)
Grade 12	1.273***	0.712***	0.953***
	(0.100)	(0.178)	(0.186)
Administrator commitment	0.446	0.206	0.684
	(0.372)	(0.455)	(0.524)
Funding Allocated to ELOs	-0.352	0.158	-0.363
	(0.734)	(1.043)	(0.928)
Paid ELO position	-0.081	-0.573	-0.572
	(0.750)	(1.175)	(0.991)
Active membership in statewide ELO group	0.560**	0.526*	0.679**
	(0.258)	(0.305)	(0.323)
Teacher commitment	0.234	0.138	0.196
	(0.254)	(0.306)	(0.313)
Presence of multiple types of ELOs	-0.317**	-0.235	-0.042
	(0.144)	(0.188)	(0.182)

Active relationships with community partners	0.778**	1.145**	0.614
	(0.329)	(0.445)	(0.421)
VLACS not considered ELO	0.126	0.385	0.940
	(0.568)	(0.680)	(0.777)
Constant	-28.625***	-19.080**	-3.195
	(4.387)	(7.939)	(10.862)
Number of observations	12,195	3,491	2,876
Log-Likelihood	-2,672.04	-724.09	-661.33
BIC	5,569.889	1,635.818	1,513.805

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table C2: Student-Level Factors Affecting Number of ELOs Taken: A Multilevel Linear Regression

	Total School-facilitated ELOs Taken		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Total number school-facilitated ELOs taken in previous year	0.220***	0.216***	0.223***
	(0.011)	(0.016)	(0.020)
Missing data for school-facilitated ELOs in previous year	-0.070***	-0.058	-0.140***
	(0.017)	(0.040)	(0.050)
Average score on 8th grade NECAP exams	0.001*	-0.001	-0.003
	(0.000)	(0.001)	(0.002)
Female	0.048***	0.057***	0.058**
	(0.008)	(0.017)	(0.023)
Eligible for free/reduced-price lunch	-0.010		0.015
	(0.009)		(0.024)
Limited English proficiency	0.128***	0.081**	0.125***
	(0.024)	(0.032)	(0.048)
Student in special education program	0.030**	0.009	0.028
	(0.012)	(0.022)	(0.025)
Hispanic	-0.004	0.013	-0.029
	(0.014)	(0.023)	(0.034)
Black	0.041**	0.063**	0.001
	(0.021)	(0.031)	(0.047)
Asian	0.024	0.116***	0.061
	(0.020)	(0.041)	(0.063)
American Indian or Alaska Native	0.107*	0.155	0.268*
	(0.055)	(0.108)	(0.148)
Multiracial	0.017	0.065	0.033
	(0.033)	(0.064)	(0.095)
Grade 11	0.038***	0.053***	0.044
	(0.009)	(0.020)	(0.027)
Grade 12	0.102***	0.057***	0.099***
	(0.009)	(0.020)	(0.027)
Administrator commitment	0.013	-0.031	0.012
	(0.052)	(0.047)	(0.045)
Funding Allocated to ELOs	-0.009	0.024	-0.036
	(0.107)	(0.101)	(0.092)
Paid ELO position	-0.026	-0.051	-0.083
	(0.110)	(0.110)	(0.100)

Active membership in statewide ELO group	0.037	0.035	0.052*
	(0.037)	(0.033)	(0.030)
Teacher commitment	-0.013	-0.003	-0.018
	(0.037)	(0.034)	(0.033)
Presence of multiple types of ELOs	-0.016	-0.005	0.002
	(0.021)	(0.019)	(0.018)
Active relationships with community partners	0.100**	0.077*	0.067
	(0.049)	(0.046)	(0.044)
VLACS not considered ELO	-0.069	0.008	0.069
	(0.081)	(0.074)	(0.071)
Constant	-0.955**	0.696	2.180
	(0.475)	(0.883)	(1.678)
Number of observations	12,195	3,491	2,876
Log-Likelihood	-6,695.81	-2,413.81	-2,568.58
BIC	13,626.839	5,023.411	5,336.272

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

APPENDIX D.

Analysis of ELO Participation on Student Outcomes, Matched Comparison

Table D1: Impact of ELO-Taking on Average Daily Attendance, Matched Comparison

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	-0.662	-0.028	-1.676			
	(0.432)	(1.215)	(1.372)			
Took virtual course in either year				-0.008**	-0.016*	-0.011
				(0.003)	(0.009)	(0.012)
Average daily attendance	0.845***	0.790***	0.827***	0.007***	0.009***	0.006***
	(0.024)	(0.044)	(0.047)	(0.000)	(0.000)	(0.001)
Average score on 8th grade NECAP exams	0.036	0.021	-0.046	0.000**	0.000	-0.002
	(0.024)	(0.063)	(0.107)	(0.000)	(0.001)	(0.001)
Female	0.139	-0.448	0.222	-0.003	-0.000	-0.002
	(0.399)	(1.126)	(1.310)	(0.003)	(0.009)	(0.012)
Eligible for free/ reduced-price lunch	-0.679		0.255	-0.015***		-0.017
	(0.528)		(1.391)	(0.004)		(0.014)
Limited English proficiency	-1.048	0.894	-2.206	0.022	-0.027	-0.099*
	(1.064)	(1.822)	(2.459)	(0.025)	(0.031)	(0.053)
Student in special education program	-1.528**	-3.399**	-1.167	-0.013*	-0.012	-0.015
	(0.647)	(1.530)	(1.474)	(0.007)	(0.014)	(0.015)
Hispanic	-2.834***	-0.561	-0.411	-0.005	0.025	-0.023
	(0.881)	(1.632)	(2.132)	(0.008)	(0.016)	(0.027)
Black	0.452	1.490	3.717	0.005	0.021	0.021
	(0.946)	(1.682)	(2.426)	(0.009)	(0.015)	(0.032)
Asian	1.222	0.973	3.640	0.010	0.022	0.071*
	(0.911)	(2.031)	(3.110)	(0.006)	(0.016)	(0.039)
American Indian or Alaska Native	0.160	3.714	0.712	0.030	0.028	0.003
	(3.269)	(7.112)	(6.393)	(0.021)	(0.034)	(0.055)
Multiracial	-0.779	1.062	-3.483	0.005	-0.035	0.045
	(1.527)	(3.755)	(5.084)	(0.013)	(0.043)	(0.044)
Grade 12	-0.866**	1.130	0.874	-0.005*	0.006	-0.013
	(0.408)	(1.112)	(1.320)	(0.003)	(0.008)	(0.012)
Constant	-16.857	-0.635	51.928	-0.064	-0.073	1.988*
	(20.266)	(52.486)	(89.454)	(0.156)	(0.426)	(1.136)
Number of observations	1,972	500	506	2,998	540	438
Log-Likelihood	-7,046.00	-1,959.59	-2,060.50	3,261.69	500.17	298.71
bic	14,213.382	4,012.396	4,220.623	-6,395.280	-905.966	-500.103

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D2: Impact of ELO-Taking on Likelihood of Having One or More Out-Of-School Suspensions, Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	-0.091	-0.153	-0.087			
	(0.238)	(0.411)	(0.368)			
Took virtual course in either Year				-0.151	-0.152	-0.606*
				(0.195)	(0.351)	(0.362)
Out-of-school suspensions in previous year	4.188***	4.277***	4.400***	4.292***	4.000***	3.846***
	(0.242)	(0.391)	(0.393)	(0.216)	(0.396)	(0.383)
Average score on 8th grade NECAP exams	-0.027**	-0.038*	-0.047*	-0.035***	-0.040*	0.053
	(0.013)	(0.021)	(0.025)	(0.012)	(0.022)	(0.039)
Female	-0.576***	-0.049	-0.208	-0.507***	-0.386	0.151
	(0.219)	(0.374)	(0.342)	(0.190)	(0.347)	(0.361)
Eligible for free/ reduced-price lunch	0.595**		0.461	0.509**		0.447
	(0.242)		(0.345)	(0.217)		(0.381)
Limited English proficiency	0.509	0.500	0.135	-0.840	-0.840	
	(0.457)	(0.573)	(0.604)	(1.397)	(1.737)	
Student in special education program	0.137	0.252	0.617*	0.255	-0.522	0.315
	(0.293)	(0.455)	(0.372)	(0.342)	(0.572)	(0.415)
Hispanic	0.002	0.459	-0.033	0.490	0.780	0.352
	(0.364)	(0.480)	(0.506)	(0.339)	(0.545)	(0.716)
Black	0.414	-0.279	0.282	0.542	0.863*	0.395
	(0.394)	(0.510)	(0.614)	(0.421)	(0.513)	(0.798)
Asian	-1.313**	-1.976*	-0.568	-0.731	-1.061	-15.616
	(0.591)	(1.029)	(0.836)	(0.494)	(1.066)	(876.580)
American Indian or Alaska Native	-0.666	1.239	-0.862			
	(2.300)	(3.240)	(1.776)			
Multiracial	-0.060	-1.090	-0.535	-0.157	0.512	
	(0.809)	(1.527)	(1.187)	(0.785)	(1.424)	
Grade 12	0.090	0.098	0.492	-0.322*	0.449	-0.185
	(0.227)	(0.356)	(0.341)	(0.190)	(0.355)	(0.371)
Constant	18.880*	28.434*	34.769*	25.549**	31.283*	-47.275
	(11.275)	(17.257)	(20.722)	(9.977)	(18.517)	(32.813)
Number of observations	1,972	500	506	2,998	540	438
Log-Likelihood	-362.49	-131.32	-154.60	-475.17	-134.95	-128.60
bic	838.782	349.640	402.595	1,062.413	351.696	330.195

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D3: Impact of ELO-Taking on Credits Earned, Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.487***	0.180	0.672*			
	(0.187)	(0.262)	(0.363)			
Took virtual course in either year				-0.202	-0.126	-0.539
				(0.142)	(0.307)	(0.328)
Average daily attendance	0.032***	0.032***	0.031***	4.188***	1.659	2.329**
	(0.007)	(0.007)	(0.008)	(0.693)	(1.078)	(1.081)
Average score on 8th grade NECAP exams	0.044***	0.037***	0.035	0.060***	0.074***	0.036
	(0.010)	(0.013)	(0.026)	(0.009)	(0.017)	(0.035)
Female	0.267	0.109	-0.114	0.213	0.833***	-0.192
	(0.164)	(0.224)	(0.317)	(0.140)	(0.292)	(0.311)
Eligible for free/ reduced-price lunch	-0.118		-0.819**	-0.195		-0.088
	(0.219)		(0.339)	(0.193)		(0.357)
Limited English proficiency	-0.672	-0.244	0.324	1.876*	1.150	-0.452
	(0.444)	(0.363)	(0.606)	(1.140)	(1.032)	(1.340)
Student in special education program	-0.062	0.160	0.139	-0.463	0.446	0.205
	(0.271)	(0.313)	(0.368)	(0.319)	(0.488)	(0.391)
Hispanic	0.770**	0.539	0.725	-0.097	-0.342	0.076
	(0.368)	(0.338)	(0.517)	(0.355)	(0.555)	(0.713)
Black	0.795**	0.111	1.680***	-0.190	0.166	0.315
	(0.395)	(0.345)	(0.599)	(0.440)	(0.513)	(0.826)
Asian	0.704*	1.355***	0.741	0.210	0.610	1.068
	(0.375)	(0.408)	(0.762)	(0.280)	(0.536)	(0.984)
American Indian or Alaska Native	0.609	-1.252	-0.159	-2.402**	-1.099	-1.403
	(1.449)	(1.391)	(1.715)	(0.965)	(1.154)	(1.412)
Multiracial	-0.900	-0.410	-0.248	0.016	-0.504	0.569
	(0.635)	(0.794)	(1.206)	(0.614)	(1.454)	(1.111)
Grade 12	1.187***	0.276	0.461	1.969***	0.577**	1.289***
	(0.168)	(0.222)	(0.321)	(0.138)	(0.290)	(0.318)
Constant	-33.182***	-27.058**	-25.040	-47.574***	-57.286***	-25.553
	(8.557)	(10.637)	(21.813)	(7.301)	(14.694)	(29.045)
Number of observations	1,939	485	487	2,958	530	420
Log-Likelihood	-5,231.61	-1,145.53	-1,310.74	-8,123.91	-1,403.77	-1,097.62
bic	10,584.329	2,383.828	2,720.496	16,375.691	2,901.626	2,291.893

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D4: Impact of ELO-Taking on Likelihood of Being On-Track to Graduate, Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.496***	0.559**	0.352			
	(0.122)	(0.251)	(0.220)			
Took virtual course in either year				-0.205**	-0.021	-0.056
				(0.088)	(0.224)	(0.246)
Average daily attendance	0.029***	0.015*	0.005	4.086***	6.082***	2.267**
	(0.006)	(0.008)	(0.006)	(0.528)	(1.182)	(0.916)
Average score on 8th grade NECAP exams	0.092***	0.073***	0.063***	0.101***	0.100***	0.065**
	(0.007)	(0.014)	(0.020)	(0.006)	(0.015)	(0.031)
Female	0.112	-0.463**	0.141	0.066	-0.063	0.093
	(0.108)	(0.223)	(0.212)	(0.086)	(0.217)	(0.238)
Eligible for free/ reduced-price lunch	-0.336**		-0.304	-0.248**		0.164
	(0.144)		(0.230)	(0.118)		(0.275)
Limited English proficiency	-0.064	0.114	0.741*	0.643	0.092	
	(0.295)	(0.357)	(0.394)	(0.700)	(0.856)	
Student in special education program	-0.403**	-0.903***	-0.511**	-0.352*	0.263	-0.611*
	(0.181)	(0.347)	(0.247)	(0.211)	(0.385)	(0.316)
Hispanic	-0.082	-0.117	0.292	-0.082	-0.885**	0.524
	(0.236)	(0.322)	(0.342)	(0.214)	(0.421)	(0.514)
Black	-0.133	0.155	0.264	-0.499*	-0.420	-0.525
	(0.262)	(0.323)	(0.394)	(0.271)	(0.353)	(0.703)
Asian	0.491*	0.518	0.780	0.166	0.782*	1.706*
	(0.273)	(0.390)	(0.481)	(0.179)	(0.450)	(0.890)
American Indian or Alaska Native	0.298	-0.473		-0.402	-0.537	
	(0.945)	(1.461)		(0.570)	(0.937)	
Multiracial	0.458	0.058		0.322	0.259	1.308
	(0.425)	(0.861)		(0.391)	(1.178)	(0.889)
Grade 12	0.644***	0.718***	0.679***	0.775***	0.664***	0.498**
	(0.112)	(0.221)	(0.224)	(0.087)	(0.217)	(0.250)
Constant	-80.838***	-63.271***	-54.513***	-88.966***	-90.416***	-57.200**
	(6.345)	(11.385)	(16.718)	(5.161)	(12.587)	(25.590)
Number of observations	1,960	494	497	2,976	539	424
Log-Likelihood	-1,086.50	-277.56	-282.29	-1,693.10	-299.00	-238.01
bic	2,286.717	641.961	645.298	3,506.168	686.055	554.674

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D5: Impact of ELO-Taking on Likelihood of Taking the PSAT, Non-Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.266*	-0.050	-0.100			
	(0.142)	(0.304)	(0.301)			
Took virtual course in either year				0.155	0.276	0.160
				(0.103)	(0.239)	(0.266)
Average daily attendance	0.048***	0.043***	0.062***	5.978***	4.048***	4.134***
	(0.007)	(0.011)	(0.013)	(0.597)	(0.974)	(1.222)
Average score on 8th grade NECAP exams	0.091***	0.098***	0.054**	0.097***	0.084***	0.075**
	(0.008)	(0.017)	(0.024)	(0.007)	(0.015)	(0.032)
Female	0.321***	0.923***	0.636**	0.345***	0.394*	0.572**
	(0.125)	(0.272)	(0.268)	(0.100)	(0.223)	(0.258)
Eligible for free/ reduced-price lunch	-0.700***		-0.725**	-0.250*		-0.392
	(0.162)		(0.284)	(0.131)		(0.302)
Limited English proficiency	-1.881***	-1.567***	-0.791	-1.811**	-1.558**	-0.377
	(0.390)	(0.490)	(0.570)	(0.794)	(0.795)	(1.280)
Student in special education program	-0.898***	0.159	-0.654**	-0.415*	0.348	0.046
	(0.205)	(0.383)	(0.315)	(0.214)	(0.366)	(0.321)
Hispanic	0.085	-0.001	0.046	-0.123	-0.097	-0.320
	(0.284)	(0.409)	(0.453)	(0.241)	(0.421)	(0.594)
Black	0.461	0.737*	0.334	-0.097	-0.415	0.833
	(0.296)	(0.394)	(0.531)	(0.281)	(0.366)	(0.655)
Asian	1.004***	1.386***	0.827	0.764***	1.907***	0.854
	(0.335)	(0.472)	(0.601)	(0.247)	(0.498)	(0.762)
American Indian or Alaska Native	0.112	1.010	1.274	0.826	0.805	-0.167
	(1.036)	(1.517)	(1.076)	(0.852)	(0.882)	(1.278)
Multiracial	0.390	1.117	0.488	0.307	0.297	-0.016
	(0.487)	(0.743)	(0.939)	(0.417)	(1.087)	(0.845)
Grade 12	-0.194	-0.563**	-0.835***	-0.132	-0.360	-0.461*
	(0.129)	(0.264)	(0.265)	(0.100)	(0.226)	(0.258)
Constant	-80.534***	-87.301***	-50.126**	-86.978***	-74.254***	-66.827**
	(7.187)	(14.117)	(20.304)	(5.839)	(12.444)	(26.599)
Number of observations	1,972	500	506	2,998	540	438
Log-Likelihood	-883.67	-223.80	-220.66	-1,325.12	-291.90	-229.99
bic	1,881.141	534.606	534.718	2,770.328	671.874	551.216

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D6: Impact of ELO-Taking on Likelihood of Taking the SAT (Seniors Only), Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.302**	0.542*	0.515			
	(0.119)	(0.297)	(0.361)			
Took virtual course in either year				0.220***	0.713***	0.302
				(0.081)	(0.231)	(0.278)
Average daily attendance	0.026***	0.055***	0.025*	2.616***	5.795***	3.840**
	(0.007)	(0.017)	(0.013)	(0.533)	(1.517)	(1.530)
Average score on 8th grade NECAP exams	0.053***	0.085***	0.055	0.040***	0.054***	0.032
	(0.007)	(0.018)	(0.036)	(0.005)	(0.014)	(0.036)
Female	0.315***	0.439	0.636*	0.157*	0.383*	0.411
	(0.107)	(0.275)	(0.334)	(0.081)	(0.230)	(0.274)
Eligible for free/ reduced-price lunch	-0.477***		-0.890**	-0.233**		-0.243
	(0.154)		(0.374)	(0.117)		(0.333)
Limited English proficiency	-1.310***	-0.646	-2.377**	-1.520	-0.363	
	(0.382)	(0.454)	(0.943)	(1.075)	(0.835)	
Student in special education program	-1.157***	-0.686	-1.309***	-0.789***	-0.742	-1.057**
	(0.231)	(0.529)	(0.462)	(0.243)	(0.487)	(0.444)
Hispanic	-0.281	0.142	0.244	-0.305	-0.261	0.372
	(0.270)	(0.414)	(0.563)	(0.220)	(0.450)	(0.618)
Black	-0.027	0.175	0.355	-0.057	-0.604	0.617
	(0.288)	(0.427)	(0.632)	(0.270)	(0.435)	(0.642)
Asian	1.106***	1.573***	2.064***	0.625***	1.112***	1.934***
	(0.263)	(0.441)	(0.739)	(0.159)	(0.377)	(0.695)
American Indian or Alaska Native	1.787**	1.332	-14.130	0.702		
	(0.871)	(1.317)	(1,028.604)	(0.546)		
Multiracial	-0.404	0.500	-13.338	-0.123		
	(0.453)	(0.853)	(835.317)	(0.365)		
Constant	-47.528***	-78.216***	-50.240*	-36.920***	-52.576***	-31.815
	(5.808)	(14.909)	(30.004)	(4.230)	(11.983)	(30.333)
Number of observations	1,972	500	506	2,998	540	438
Log-Likelihood	-1,115.62	-198.51	-148.00	-1,869.07	-271.16	-193.31
bic	2,337.461	477.810	383.166	3,850.228	611.518	453.531

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D7: Impact of ELO-Taking on Likelihood of Graduation (Seniors Only), Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.432	0.537	0.433			
	(0.267)	(0.550)	(0.347)			
Took virtual course in either year				-0.394*	-0.297	-0.773*
				(0.214)	(0.422)	(0.416)
Average daily attendance	0.062***	0.056***	0.050***	8.244***	6.758***	8.812***
	(0.008)	(0.015)	(0.009)	(0.852)	(1.325)	(1.511)
Average score on 8th grade NECAP exams	0.046***	-0.001	0.043*	0.058***	0.034	0.026
	(0.014)	(0.030)	(0.024)	(0.013)	(0.026)	(0.042)
Female	0.462*	-0.182	-0.365	0.680***	0.407	-0.318
	(0.242)	(0.501)	(0.335)	(0.213)	(0.437)	(0.397)
Eligible for free/ reduced-price lunch	-0.181		0.527	-0.052		0.410
	(0.283)		(0.358)	(0.246)		(0.497)
Limited English proficiency	-0.727	-1.619*	-0.843	18.029		11.397
	(0.566)	(0.981)	(0.697)	(18,770.594)		(832.508)
Student in special education program	-0.925***	-1.776***	-0.910***	-0.734**	-1.284**	-0.684
	(0.292)	(0.585)	(0.353)	(0.322)	(0.530)	(0.476)
Hispanic	0.978	0.856	0.387	-0.107	1.347	0.096
	(0.623)	(0.978)	(0.698)	(0.462)	(1.088)	(0.822)
Black	0.614	-0.224	-0.387	0.050	14.091	-0.499
	(0.558)	(0.751)	(0.625)	(0.628)	(994.531)	(0.863)
Asian	0.092	1.468	14.472	0.784	-0.105	1.800
	(0.575)	(1.356)	(749.625)	(0.635)	(0.807)	(1.622)
American Indian or Alaska Native	11.095	11.615		-0.249		0.066
	(523.951)	(1,006.478)		(0.887)		(1.714)
Multiracial	-0.913	-2.244	0.159	-0.221		1.955
	(0.674)	(1.536)	(0.953)	(0.773)		(2.758)
Constant	-41.910***	-0.528	-38.051*	-53.894***	-32.381	-27.034
	(12.183)	(24.784)	(20.514)	(11.178)	(22.354)	(34.792)
Number of observations	1,257	271	310	1,666	294	277
Log-Likelihood	-283.97	-69.39	-133.46	-363.82	-87.10	-99.81
bic	667.853	211.615	341.488	831.503	231.040	278.357

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D8: Impact of ELO-Taking on SAT Composite Score (Seniors Only), Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	155.159***	181.328***	82.666*			
	(35.855)	(68.335)	(46.573)			
Took virtual course in either year				93.700***	207.307***	-16.529
				(30.548)	(68.339)	(62.394)
Average daily attendance	10.739***	8.626***	3.777***	1,453.821***	1,739.567***	784.373***
	(1.411)	(2.278)	(1.282)	(145.459)	(245.005)	(183.862)
Average score on 8th grade NECAP exams	42.825***	31.192***	4.384	44.108***	40.113***	16.274**
	(2.016)	(3.977)	(3.758)	(1.834)	(4.177)	(6.896)
Female	54.659	56.448	80.286*	9.881	172.772***	134.152**
	(33.292)	(64.523)	(47.220)	(30.050)	(66.503)	(62.744)
Eligible for free/ reduced-price lunch	-209.942***		-139.221***	-103.595**		-17.153
	(45.147)		(50.529)	(40.277)		(73.237)
Limited English proficiency	-256.555***	-358.627***	-289.490***	-320.100	-773.461*	-240.395
	(90.573)	(109.476)	(92.460)	(352.336)	(405.406)	(311.312)
Student in special education program	-175.435***	-180.582**	-184.761***	-248.278***	-180.383*	-189.170**
	(52.716)	(87.232)	(51.108)	(66.017)	(104.897)	(80.085)
Hispanic	-140.567*	71.530	165.923*	-128.866	11.745	-56.567
	(81.999)	(104.158)	(91.378)	(82.345)	(123.734)	(141.650)
Black	156.356*	54.083	-0.244	110.424	174.677	-19.888
	(86.199)	(97.097)	(96.697)	(102.791)	(165.327)	(168.760)
Asian	310.198***	370.418***	307.247**	269.187***	589.382***	312.620**
	(71.249)	(117.771)	(119.907)	(59.277)	(120.098)	(156.024)
American Indian or Alaska Native	362.697	422.469		144.791	55.599	41.596
	(332.882)	(530.722)		(158.469)	(328.946)	(298.403)
Multiracial	162.466	163.529	85.146	44.974	-295.925	-183.336
	(136.929)	(266.975)	(142.907)	(122.539)	(284.258)	(195.564)
Constant	-36,322.704***	-26,521.763***	-3,707.729	-37,705.795***	-34,869.581***	-13,878.161**
	(1,694.334)	(3,323.201)	(3,143.521)	(1,540.661)	(3,513.385)	(5,765.032)
Number of observations	1,260	272	312	1,666	294	278
Log-Likelihood	-9,793.98	-2,089.21	-2,308.84	-13,033.00	-2,279.20	-2,127.73
bic	19,695.034	4,256.898	4,698.076	26,177.274	4,637.966	4,339.882

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table D9: Impact of ELO-Taking on Likelihood of College Enrollment after Graduation (Seniors Only), Matched Comparison

(continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	0.447***	-0.287	-0.153			
	(0.156)	(0.295)	(0.295)			
Took virtual course in either year				0.104	0.215	0.550*
				(0.117)	(0.280)	(0.306)
Average daily attendance	0.044***	0.040**	0.037**	5.441***	4.062**	6.947***
	(0.010)	(0.017)	(0.018)	(0.903)	(1.750)	(2.098)
Average score on 8th grade NECAP exams	0.075***	0.058***	-0.002	0.053***	0.051***	0.075**
	(0.010)	(0.018)	(0.025)	(0.007)	(0.018)	(0.037)
Female	0.318**	0.409	0.717**	0.259**	0.544*	0.417
	(0.142)	(0.297)	(0.299)	(0.118)	(0.293)	(0.316)
Eligible for free/ reduced-price lunch	-0.445**		-0.743**	-0.284*		0.146
	(0.195)		(0.342)	(0.156)		(0.375)
Limited English proficiency	-0.448	-0.320	-0.639	-1.566	11.475	
	(0.375)	(0.517)	(0.589)	(1.264)	(691.087)	
Student in special education program	-0.840***	-1.616***	-1.179***	-0.323	-0.564	-0.248
	(0.239)	(0.593)	(0.375)	(0.265)	(0.521)	(0.415)
Hispanic	-0.417	-0.378	-0.017	-0.016	0.386	-0.334
	(0.366)	(0.439)	(0.572)	(0.290)	(0.533)	(0.911)
Black	0.313	0.592	0.891	-0.002	0.382	0.075
	(0.377)	(0.412)	(0.623)	(0.420)	(0.630)	(0.828)
Asian	0.240	0.798	1.449**	0.270	1.281**	0.966
	(0.301)	(0.503)	(0.707)	(0.238)	(0.583)	(0.697)
American Indian or Alaska Native	1.897	1.371		-0.441	0.443	
	(1.432)	(1.620)		(0.607)	(1.307)	
Multiracial	1.658**	14.374		0.314	1.141	0.750
	(0.745)	(1,037.199)		(0.459)	(1.183)	(0.959)
Constant	-67.173***	-52.250***	-1.920	-49.592***	-46.783***	-69.448**
	(8.018)	(15.437)	(21.050)	(6.330)	(14.868)	(30.861)
Number of observations	1,168	248	246	1,508	246	210
Log-Likelihood	-637.86	-139.36	-137.25	-883.73	-149.83	-127.32
bic	1,374.604	350.398	340.573	1,869.921	371.236	318.798

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

APPENDIX E.

Analysis of ELO Participation on Student Outcomes, Non-Matched Comparison

Table E1: Impact of ELO-Taking on Average Daily Attendance, Non-Matched Comparison

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	-0.340	0.281	-1.483*			
	(0.313)	(0.778)	(0.826)			
Took virtual course in either year				-0.004	-0.008	-0.004
				(0.003)	(0.007)	(0.009)
Average daily attendance	0.815***	0.768***	0.841***	0.008***	0.008***	0.008***
	(0.012)	(0.022)	(0.023)	(0.000)	(0.000)	(0.000)
Average score on 8th grade NECAP exams	0.046***	0.057**	-0.036	0.000***	0.001**	-0.000
	(0.012)	(0.028)	(0.048)	(0.000)	(0.000)	(0.000)
Female	-0.203	-0.980**	0.121	-0.002	-0.009**	0.001
	(0.190)	(0.462)	(0.524)	(0.002)	(0.005)	(0.005)
Eligible for free/ reduced-price lunch	-1.399***		-0.665	-0.014***		-0.007
	(0.236)		(0.549)	(0.002)		(0.006)
Limited English proficiency	0.484	-0.108	-0.686	0.004	-0.002	-0.008
	(0.597)	(0.905)	(1.231)	(0.006)	(0.009)	(0.012)
Student in special education program	-0.580**	-0.545	-0.836	-0.006**	-0.006	-0.009
	(0.296)	(0.601)	(0.571)	(0.003)	(0.006)	(0.006)
Hispanic	-0.593	0.366	-0.551	-0.006	0.003	-0.005
	(0.380)	(0.656)	(0.818)	(0.004)	(0.007)	(0.008)
Black	1.474***	2.824***	1.913*	0.015***	0.029***	0.018*
	(0.503)	(0.827)	(1.073)	(0.005)	(0.008)	(0.011)
Asian	0.893*	2.352**	1.431	0.009**	0.024**	0.014
	(0.472)	(1.053)	(1.436)	(0.005)	(0.011)	(0.014)
American Indian or Alaska Native	0.695	0.011	-1.966	0.007	0.001	-0.020
	(1.415)	(2.873)	(3.186)	(0.014)	(0.029)	(0.032)
Multiracial	-0.907	-1.520	-3.234	-0.009	-0.015	-0.032
	(0.874)	(1.860)	(2.023)	(0.009)	(0.019)	(0.020)
Grade 12	-0.362*	0.774*	0.424	-0.004**	0.008*	0.004
	(0.189)	(0.458)	(0.514)	(0.002)	(0.005)	(0.005)
Constant	-22.558**	-29.124	42.649	-0.237**	-0.327	0.366
	(9.867)	(23.763)	(40.363)	(0.099)	(0.240)	(0.403)
Number of observations	8,179	2,210	2,030	8,179	2,210	2,030
Log-Likelihood	-29,073.07	-8,374.04	-7,827.54	8,593.33	1,803.97	1,519.47
bic	58,290.281	16,863.591	15,776.939	-17,042.509	-3,492.420	-2,917.080

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E2: Impact of ELO-Taking on Likelihood of Having One or More Out-Of-School Suspensions, Non-Matched Comparison (continued)

	School-facilitated ELOs			Virtual Courses		
	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup	Whole Population	Economically Disadvantaged Subgroup	Academically Low-Performing Subgroup
Took school-facilitated ELO in either year	-0.054	-0.240	0.208			
	(0.169)	(0.268)	(0.253)			
Took virtual course in either tear				-0.194	-0.208	-0.474
				(0.146)	(0.271)	(0.293)
Out-of-school suspensions in previous year	4.047***	4.053***	3.944***	4.046***	4.038***	3.968***
	(0.109)	(0.175)	(0.170)	(0.109)	(0.174)	(0.170)
Average score on 8th grade NECAP exams	-0.028***	-0.015	-0.001	-0.027***	-0.014	-0.002
	(0.006)	(0.009)	(0.014)	(0.006)	(0.009)	(0.014)
Female	-0.374***	-0.355**	-0.312*	-0.369***	-0.363**	-0.283*
	(0.100)	(0.155)	(0.166)	(0.100)	(0.154)	(0.165)
Eligible for free/reduced-price lunch	0.587***		0.462***	0.581***		0.431**
	(0.109)		(0.167)	(0.109)		(0.167)
Limited English proficiency	0.179	0.263	0.110	0.157	0.232	0.107
	(0.250)	(0.280)	(0.350)	(0.250)	(0.279)	(0.351)
Student in special education program	0.003	-0.011	0.216	-0.009	-0.017	0.192
	(0.135)	(0.193)	(0.175)	(0.136)	(0.194)	(0.175)
Hispanic	0.127	0.388*	0.301	0.125	0.380*	0.286
	(0.155)	(0.200)	(0.232)	(0.155)	(0.200)	(0.232)
Black	0.150	0.163	0.435	0.145	0.134	0.449
	(0.207)	(0.260)	(0.300)	(0.207)	(0.259)	(0.300)
Asian	-0.790***	-0.722*	-0.550	-0.785***	-0.738*	-0.546
	(0.299)	(0.431)	(0.483)	(0.300)	(0.430)	(0.489)
American Indian or Alaska Native	-0.009	0.968	0.649	0.011	1.012	0.694
	(0.732)	(0.950)	(0.925)	(0.732)	(0.953)	(0.920)
Multiracial	0.278	0.183	0.666	0.280	0.164	0.696
	(0.405)	(0.598)	(0.580)	(0.405)	(0.596)	(0.574)
Grade 12	-0.098	-0.209	-0.012	-0.094	-0.211	0.009
	(0.098)	(0.153)	(0.160)	(0.098)	(0.153)	(0.160)
Constant	19.537***	9.868	-2.661	18.953***	8.979	-2.095
	(5.161)	(7.914)	(11.839)	(5.186)	(7.970)	(11.792)
Number of observations	8,179	2,210	2,030	8,179	2,210	2,030
Log-Likelihood	-1,640.30	-652.52	-601.51	-1,639.46	-652.63	-600.49
bic	3,415.738	1,412.854	1,317.251	3,414.061	1,413.063	1,315.223

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E3: Impact of ELO-Taking on Credits Earned, Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.153	0.185	0.555**			
	(0.139)	(0.247)	(0.245)			
Took VLACS course in either Year				-0.199*	-0.149	-0.573**
				(0.112)	(0.231)	(0.251)
Average daily attendance	0.044***	0.036***	0.042***	4.397***	3.558***	4.104***
	(0.004)	(0.005)	(0.005)	(0.385)	(0.528)	(0.496)
Average score on 8th Grade NECAP exams	0.052***	0.061***	0.017	0.053***	0.062***	0.015
	(0.005)	(0.009)	(0.014)	(0.005)	(0.009)	(0.014)
Female	0.174**	0.400***	0.092	0.192**	0.418***	0.148
	(0.084)	(0.143)	(0.151)	(0.084)	(0.143)	(0.151)
Eligible for free/ reduced-price lunch	-0.063		-0.346**	-0.074		-0.381**
	(0.104)		(0.158)	(0.105)		(0.159)
Limited English proficiency	0.193	0.367	0.285	0.181	0.368	0.310
	(0.266)	(0.280)	(0.361)	(0.266)	(0.281)	(0.361)
Student in special education program	-0.036	0.098	-0.155	-0.046	0.093	-0.185
	(0.131)	(0.187)	(0.165)	(0.131)	(0.188)	(0.166)
Hispanic	0.133	0.099	0.226	0.133	0.100	0.203
	(0.169)	(0.206)	(0.238)	(0.169)	(0.206)	(0.238)
Black	0.347	0.124	0.660**	0.360	0.144	0.686**
	(0.223)	(0.260)	(0.310)	(0.223)	(0.259)	(0.310)
Asian	0.154	0.262	0.586	0.185	0.289	0.597
	(0.207)	(0.327)	(0.416)	(0.207)	(0.327)	(0.416)
American Indian or Alaska Native	-1.857***	-1.484*	-1.038	-1.842***	-1.474*	-1.041
	(0.636)	(0.882)	(0.943)	(0.636)	(0.883)	(0.943)
Multiracial	-0.049	0.555	0.143	-0.037	0.556	0.190
	(0.386)	(0.589)	(0.586)	(0.386)	(0.589)	(0.586)
Grade 12	1.955***	0.805***	1.043***	1.973***	0.816***	1.093***
	(0.083)	(0.142)	(0.148)	(0.083)	(0.142)	(0.148)
Constant	-40.990***	-47.737***	-10.891	-41.987***	-48.384***	-9.655
	(4.509)	(7.477)	(11.728)	(4.527)	(7.554)	(11.699)
Number of observations	8,054	2,169	1,975	8,054	2,169	1,975
Log-Likelihood	-21,997.18	-5,693.73	-5,168.16	-21,996.20	-5,693.81	-5,168.12
bic	44,138.264	11,502.699	10,457.732	44,136.310	11,502.846	10,457.651

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E4: Impact of ELO-Taking on Likelihood of Being On-Track to Graduate, Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.476***	0.290*	0.198			
	(0.088)	(0.169)	(0.169)			
Took VLACS course in either Year				-0.149**	-0.071	-0.078
				(0.069)	(0.156)	(0.177)
Average daily attendance	0.035***	0.027***	0.017***	3.455***	2.695***	1.654***
	(0.003)	(0.005)	(0.004)	(0.306)	(0.454)	(0.421)
Average score on 8th Grade NECAP exams	0.092***	0.068***	0.041***	0.094***	0.069***	0.041***
	(0.004)	(0.007)	(0.011)	(0.004)	(0.007)	(0.011)
Female	0.158***	0.209**	0.133	0.187***	0.228**	0.147
	(0.051)	(0.101)	(0.111)	(0.051)	(0.101)	(0.111)
Eligible for free/ reduced-price lunch	-0.252***		-0.160	-0.269***		-0.166
	(0.065)		(0.118)	(0.065)		(0.119)
Limited English proficiency	0.069	0.007	0.500*	0.093	0.020	0.515**
	(0.169)	(0.201)	(0.258)	(0.169)	(0.201)	(0.257)
Student in special education program	-0.392***	-0.449***	-0.546***	-0.403***	-0.459***	-0.552***
	(0.087)	(0.143)	(0.128)	(0.087)	(0.143)	(0.128)
Hispanic	-0.228**	-0.226	-0.252	-0.229**	-0.222	-0.260
	(0.106)	(0.146)	(0.180)	(0.106)	(0.146)	(0.180)
Black	-0.112	-0.100	-0.341	-0.073	-0.069	-0.331
	(0.139)	(0.180)	(0.239)	(0.139)	(0.179)	(0.238)
Asian	0.123	0.266	0.256	0.155	0.291	0.261
	(0.129)	(0.225)	(0.288)	(0.129)	(0.224)	(0.288)
American Indian or Alaska Native	-0.502	-0.082	-1.260	-0.480	-0.071	-1.260
	(0.410)	(0.683)	(1.067)	(0.408)	(0.679)	(1.068)
Multiracial	0.026	0.227	0.679*	0.051	0.233	0.687*
	(0.240)	(0.418)	(0.393)	(0.240)	(0.417)	(0.393)
Grade 12	0.703***	0.842***	0.841***	0.737***	0.855***	0.854***
	(0.052)	(0.102)	(0.113)	(0.052)	(0.102)	(0.113)
Constant	-81.701***	-60.758***	-37.329***	-82.845***	-61.260***	-36.739***
	(3.090)	(5.750)	(9.491)	(3.107)	(5.819)	(9.469)
Number of observations	8,111	2,199	2,002	8,111	2,199	2,002
Log-Likelihood	-4,619.22	-1,232.45	-1,053.52	-4,631.58	-1,233.82	-1,054.10
bic	9,373.464	2,572.644	2,221.067	9,398.167	2,575.382	2,222.232

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E5: Impact of ELO-Taking on Likelihood of Taking the PSAT, Model 3: Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.409***	0.055	0.048			
	(0.098)	(0.197)	(0.211)			
Took VLACS course in either Year				0.298***	0.736***	0.217
				(0.079)	(0.175)	(0.191)
Average daily attendance	0.049***	0.043***	0.047***	4.980***	4.471***	4.732***
	(0.003)	(0.005)	(0.006)	(0.336)	(0.518)	(0.560)
Average score on 8th Grade NECAP exams	0.078***	0.050***	0.068***	0.077***	0.047***	0.067***
	(0.004)	(0.007)	(0.012)	(0.004)	(0.007)	(0.012)
Female	0.356***	0.352***	0.278**	0.363***	0.309***	0.265**
	(0.059)	(0.109)	(0.120)	(0.059)	(0.110)	(0.121)
Eligible for free/ reduced-price lunch	-0.475***		-0.420***	-0.470***		-0.411***
	(0.072)		(0.128)	(0.072)		(0.128)
Limited English proficiency	-1.603***	-1.634***	-0.563*	-1.540***	-1.591***	-0.556*
	(0.205)	(0.238)	(0.308)	(0.206)	(0.239)	(0.308)
Student in special education program	-0.826***	-0.782***	-0.248*	-0.805***	-0.775***	-0.233*
	(0.091)	(0.147)	(0.132)	(0.091)	(0.147)	(0.132)
Hispanic	-0.042	0.148	0.199	-0.041	0.161	0.210
	(0.121)	(0.162)	(0.195)	(0.122)	(0.162)	(0.196)
Black	0.227	0.596***	0.828***	0.254	0.591***	0.835***
	(0.157)	(0.199)	(0.257)	(0.157)	(0.200)	(0.257)
Asian	0.648***	1.059***	0.941***	0.656***	1.033***	0.954***
	(0.165)	(0.254)	(0.315)	(0.166)	(0.255)	(0.315)
American Indian or Alaska Native	-0.075	0.662	0.014	-0.106	0.571	0.016
	(0.451)	(0.674)	(0.736)	(0.453)	(0.681)	(0.737)
Multiracial	0.332	0.885**	0.420	0.327	0.900**	0.400
	(0.271)	(0.443)	(0.447)	(0.271)	(0.444)	(0.447)
Grade 12	-0.230***	-0.404***	-0.381***	-0.215***	-0.436***	-0.388***
	(0.059)	(0.110)	(0.119)	(0.059)	(0.111)	(0.119)
Constant	-69.384***	-46.582***	-61.097***	-68.669***	-43.554***	-60.497***
	(3.377)	(5.953)	(10.212)	(3.388)	(5.992)	(10.195)
Number of observations	8,179	2,210	2,030	8,179	2,210	2,030
Log-Likelihood	-3,676.88	-1,100.71	-952.46	-3,678.35	-1,091.77	-951.85
bic	7,488.907	2,309.228	2,019.155	7,491.832	2,291.344	2,017.931

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E6: Impact of ELO-Taking on Likelihood of Taking the SAT (Seniors Only), Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.792***	0.617***	0.445*			
	(0.084)	(0.200)	(0.238)			
Took VLACS course in either Year				0.431***	0.792***	0.618***
				(0.066)	(0.170)	(0.205)
Average daily attendance	0.023***	0.040***	0.034***	2.424***	4.228***	3.477***
	(0.004)	(0.008)	(0.008)	(0.357)	(0.799)	(0.854)
Average score on 8th Grade NECAP exams	0.044***	0.057***	0.071***	0.044***	0.052***	0.068***
	(0.003)	(0.009)	(0.019)	(0.003)	(0.009)	(0.019)
Female	0.196***	0.262**	0.387***	0.203***	0.237*	0.364**
	(0.054)	(0.128)	(0.149)	(0.053)	(0.129)	(0.150)
Eligible for free/ reduced-price lunch	-0.403***		-0.518***	-0.394***		-0.484***
	(0.074)		(0.167)	(0.073)		(0.168)
Limited English proficiency	-1.095***	-1.062***	-1.131**	-0.900***	-0.890***	-1.036**
	(0.257)	(0.306)	(0.519)	(0.256)	(0.305)	(0.519)
Student in special education program	-0.939***	-1.331***	-0.898***	-0.892***	-1.323***	-0.837***
	(0.114)	(0.260)	(0.193)	(0.113)	(0.261)	(0.194)
Hispanic	-0.436***	-0.060	-0.086	-0.442***	-0.014	-0.042
	(0.130)	(0.193)	(0.258)	(0.131)	(0.193)	(0.259)
Black	-0.107	0.190	0.352	-0.065	0.233	0.382
	(0.161)	(0.231)	(0.314)	(0.161)	(0.231)	(0.314)
Asian	0.628***	1.215***	0.956***	0.593***	1.192***	0.987***
	(0.126)	(0.251)	(0.351)	(0.127)	(0.253)	(0.353)
American Indian or Alaska Native	0.234	0.997	0.093	0.195	0.888	0.103
	(0.419)	(0.732)	(1.109)	(0.419)	(0.750)	(1.104)
Multiracial	-0.180	0.589	0.358	-0.156	0.669	0.284
	(0.262)	(0.459)	(0.574)	(0.260)	(0.455)	(0.577)
Constant	-40.768***	-53.331***	-63.744***	-40.260***	-49.250***	-61.290***
	(2.895)	(7.190)	(16.011)	(2.893)	(7.238)	(15.990)
Number of observations	8,179	2,210	2,030	8,179	2,210	2,030
Log-Likelihood	-4,329.19	-836.61	-650.90	-4,352.08	-830.75	-648.29
bic	8,784.519	1,773.323	1,408.429	8,830.289	1,761.606	1,403.192

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E7: Impact of ELO-Taking on Likelihood of Graduation (Seniors Only), Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.533**	0.800**	0.132			
	(0.212)	(0.368)	(0.285)			
Took VLACS course in either Year				-0.429***	-0.277	-0.618**
				(0.159)	(0.296)	(0.270)
Average daily attendance	0.073***	0.060***	0.069***	7.247***	5.934***	6.824***
	(0.004)	(0.007)	(0.006)	(0.442)	(0.652)	(0.645)
Average score on 8th Grade NECAP exams	0.037***	0.022*	0.060***	0.039***	0.022*	0.063***
	(0.007)	(0.012)	(0.016)	(0.007)	(0.012)	(0.016)
Female	0.549***	0.509***	0.151	0.603***	0.547***	0.199
	(0.126)	(0.196)	(0.192)	(0.126)	(0.196)	(0.194)
Eligible for free/ reduced-price lunch	-0.308**		-0.092	-0.348***		-0.145
	(0.133)		(0.196)	(0.134)		(0.197)
Limited English proficiency	-0.065	-0.237	0.431	-0.085	-0.212	0.401
	(0.344)	(0.420)	(0.509)	(0.344)	(0.418)	(0.511)
Student in special education program	-1.062***	-1.092***	-0.236	-1.100***	-1.107***	-0.272
	(0.142)	(0.210)	(0.203)	(0.144)	(0.210)	(0.204)
Hispanic	-0.051	0.280	0.266	-0.060	0.272	0.257
	(0.225)	(0.298)	(0.327)	(0.225)	(0.296)	(0.327)
Black	-0.008	0.426	-0.128	0.020	0.468	-0.106
	(0.301)	(0.386)	(0.377)	(0.301)	(0.383)	(0.378)
Asian	0.229	0.814	1.942*	0.266	0.834	1.960*
	(0.363)	(0.575)	(1.101)	(0.359)	(0.567)	(1.088)
American Indian or Alaska Native	-0.440	0.537	0.366	-0.351	0.594	0.621
	(0.718)	(1.189)	(1.173)	(0.720)	(1.184)	(1.211)
Multiracial	-0.245	0.841	0.266	-0.232	0.873	0.259
	(0.484)	(1.105)	(0.773)	(0.480)	(1.103)	(0.763)
Constant	-35.495***	-21.596**	-54.262***	-36.544***	-22.003**	-56.073***
	(6.247)	(9.764)	(13.808)	(6.242)	(9.757)	(13.823)
Number of observations	4,153	1,098	1,064	4,153	1,098	1,064
Log-Likelihood	-1,018.61	-389.33	-407.07	-1,018.49	-391.53	-404.67
bic	2,153.871	869.677	911.719	2,153.613	874.075	906.908

Notes: *Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E8: Impact of ELO-Taking on SAT Composite Score (Seniors Only), Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	158.975***	144.914***	30.327			
	(28.276)	(53.066)	(41.489)			
Took VLACS course in either Year				129.936***	284.348***	74.249*
				(24.254)	(49.990)	(41.985)
Average daily attendance	11.423***	9.049***	5.046***	1,149.246***	915.505***	503.169***
	(0.845)	(1.264)	(0.918)	(84.545)	(125.039)	(91.358)
Average score on 8th Grade NECAP exams	37.839***	24.748***	12.964***	37.445***	23.198***	12.640***
	(1.149)	(2.034)	(2.591)	(1.156)	(2.030)	(2.590)
Female	50.978***	84.720***	73.164***	52.673***	78.709**	70.567**
	(18.752)	(32.781)	(27.566)	(18.737)	(32.467)	(27.593)
Eligible for free/ reduced-price lunch	-163.486***		-81.951***	-163.726***		-78.560***
	(23.214)		(28.986)	(23.220)		(29.047)
Limited English proficiency	-298.999***	-323.700***	-202.126***	-256.455***	-278.088***	-191.288***
	(58.703)	(64.661)	(67.756)	(58.799)	(64.238)	(67.757)
Student in special education program	-231.557***	-210.652***	-130.415***	-218.649***	-202.786***	-125.610***
	(28.199)	(42.036)	(31.122)	(28.268)	(41.648)	(31.196)
Hispanic	-130.975***	-34.734	9.891	-134.124***	-22.926	9.864
	(37.767)	(46.733)	(45.133)	(37.773)	(46.207)	(45.070)
Black	48.518	133.236**	133.630**	60.615	156.667***	133.518**
	(51.646)	(61.500)	(60.989)	(51.614)	(60.494)	(60.913)
Asian	267.857***	408.312***	311.804***	261.903***	397.632***	307.545***
	(46.280)	(73.249)	(81.050)	(46.357)	(72.387)	(81.022)
American Indian or Alaska Native	143.266	203.645	-0.419	114.794	97.838	-21.661
	(140.350)	(203.642)	(179.290)	(140.516)	(202.435)	(179.381)
Multiracial	-16.272	218.080	22.286	-18.636	245.046*	13.053
	(85.843)	(140.554)	(104.953)	(85.871)	(139.065)	(104.974)
Constant	-32,154.977***	-21,136.891***	-10,903.093***	-31,826.877***	-19,882.953***	-10,643.296***
	(967.664)	(1,707.055)	(2,166.333)	(972.834)	(1,701.634)	(2,164.485)
Number of observations	4,158	1,100	1,066	4,158	1,100	1,066
Log-Likelihood	-32,460.26	-8,477.26	-8,002.35	-32,461.66	-8,465.30	-8,001.07
bic	65,045.506	17,052.556	16,109.275	65,048.305	17,028.651	16,106.723

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

Table E9: Impact of ELO-Taking on Likelihood of College Enrollment after Graduation (Seniors Only), Non-Matched Comparison (continued)

	School-facilitated ELOs			VLACS Courses		
	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup	Whole population	Economically Disadvantaged Subgroup	Academically Low Performing Subgroup
Took school-facilitated ELO in either year	0.339***	0.169	-0.049			
	(0.113)	(0.223)	(0.219)			
Took VLACS course in either Year				0.194**	0.450**	0.418*
				(0.098)	(0.216)	(0.223)
Average daily attendance	0.052***	0.046***	0.042***	5.219***	4.569***	4.353***
	(0.006)	(0.009)	(0.010)	(0.572)	(0.930)	(1.020)
Average score on 8th Grade NECAP exams	0.058***	0.043***	0.047***	0.058***	0.040***	0.047***
	(0.005)	(0.010)	(0.016)	(0.005)	(0.010)	(0.016)
Female	0.331***	0.376**	0.274*	0.339***	0.369**	0.265*
	(0.075)	(0.149)	(0.152)	(0.074)	(0.149)	(0.153)
Eligible for free/ reduced-price lunch	-0.487***		-0.375**	-0.488***		-0.356**
	(0.093)		(0.167)	(0.093)		(0.168)
Limited English proficiency	-0.477*	-0.853***	-0.394	-0.402*	-0.780**	-0.351
	(0.245)	(0.313)	(0.399)	(0.244)	(0.313)	(0.399)
Student in special education program	-0.624***	-0.925***	-0.557***	-0.608***	-0.918***	-0.540***
	(0.121)	(0.232)	(0.179)	(0.121)	(0.232)	(0.180)
Hispanic	-0.156	0.301	-0.074	-0.164	0.331*	-0.021
	(0.150)	(0.195)	(0.249)	(0.150)	(0.195)	(0.249)
Black	0.247	0.465*	0.212	0.278	0.505*	0.240
	(0.206)	(0.268)	(0.357)	(0.207)	(0.267)	(0.358)
Asian	0.507***	1.318***	0.923**	0.507***	1.312***	0.906**
	(0.193)	(0.337)	(0.417)	(0.194)	(0.338)	(0.419)
American Indian or Alaska Native	-0.111	0.819		-0.142	0.699	
	(0.575)	(0.917)		(0.577)	(0.931)	
Multiracial	0.424	0.159		0.398	0.187	0.652
	(0.347)	(0.586)		(0.346)	(0.587)	(0.551)
Constant	-53.621***	-40.936***	-43.495***	-53.263***	-38.636***	-43.317***
	(4.159)	(8.170)	(13.792)	(4.177)	(8.184)	(13.773)
Number of observations	3,740	924	869	3,740	924	869
Log-Likelihood	-2,212.62	-551.84	-525.99	-2,215.17	-549.97	-523.42
bic	4,540.415	1,192.461	1,133.187	4,545.516	1,188.710	1,134.819

*Notes: Standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05*

[1] We define "school-based ELOs" as those that were offered or managed by participating schools, distinguishing them from "virtual ELOs" which were offered through New Hampshire's Virtual Learning Academy Charter School and are discussed later in this study.

[2] New England Common Assessment Program (NECAP) are a series of reading, writing, mathematics and science achievement tests, administered annually, which were developed in collaboration with the Rhode Island and New Hampshire departments of education. The NECAP tests measure students' academic knowledge and skills relative to the Grade Expectations for Vermont's Framework of Standards and Learning Opportunities. Student scores are reported at four levels of academic achievement; Proficient with Distinction, Proficient, Partially Proficient and Substantially Below Proficient. (http://education.vermont.gov/assessment/necap)

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1250 Hancock Street

Suite 205N

Quincy, MA 02169

toll-free 877.635.5436

fax 781.348.4299

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