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Does OER Research-Based Learning Improve Performance: A Case Study from Students Enrolled in a Community College at City University of New York (CUNY)

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Abstract

This study investigates the effectiveness of Open Education Resources (OER) and research-based learning. A quantitative analysis was conducted on students enrolled in Macroeconomic courses at a City University of New York (CUNY) community college in Spring 2018 and Spring 2019. Prior studies have shown the positive effects of conducting research in natural sciences. Yet, there is a lot to be inquired about regarding the impact of research-based learning on social sciences and the use of OER materials as a cheaper and more equitable alternative to commercial textbooks. Additionally, this study evaluates the academic effectiveness of research-based learning through assessment scores through a new indicator, the growth mindset profile. Findings should be used to assess critically research-based learning applications incorporated with OER materials and open pedagogy, as well as to consider the duration, wide application throughout the program rather than isolated courses, and design of course assignments and research projects to engage students actively and effectively.

Keywords: OER, research-based learning, writing across the curriculum, WAC, growth mindset

1. Introduction

Finding the most effective teaching is the quest of an educator. Etymologically, the word ‘education’ means “I lead forth” [e-duco] in Latin. Educating students to lead would be difficult without them learning to investigate and conduct research. In 1998, the Boyer Report argued that research-based learning should become a standard practice in college courses since “learning is based on discovery guided by mentoring rather than on the transmission of information” (p. 15). Healey (2005b) provided a more detailed explanation of the various teaching formats linked with research using a two-dimensional plane. As shown in Figure 1, the horizontal dimension shows whether the emphasis is set on the research content or the research process. The vertical axis shows whether students are an audience and recipient of information or whether they actively partake in the creation of content. This creates four different formats: 1) research tutored, 2) research-led, 3) research-oriented, and 4) research-based. Research-based learning (RBL) allows the student to actively participate in the examination and inquiry since the “…curriculum is largely designed around inquiry-based activities, rather than on the acquisition of subject content…” (Griffiths, 2004, p. 722).

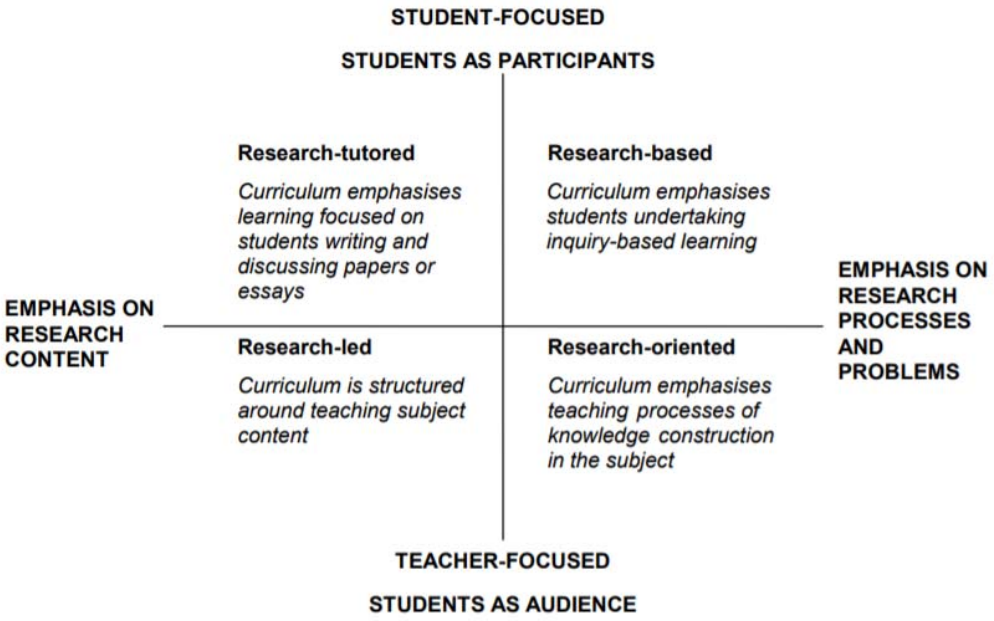

Figure 1. Format Possibilities from Linking Teaching and Research

Note. This figure is retrieved from Healey (2005b, 70) and amended.

Based on Healey's (2005b) dimensions, this article will explore the effectiveness of adopting research-based learning. While most prior studies conducted qualitative analyses, this study performs a quantitative analysis. Additionally, this study is investigating courses that have incorporated OER materials instead of commercially printed textbooks. Adopting research-based learning would make students an active searcher and curator of the material, which may help students learn better by doing, as the famous quote states "Tell me and I forget, show me and I remember, involve me and I understand." As Granjeiro explains, RBL is effective because it provides "…opportunities for the students, through active learning, to relate the theoretical contents learned in the classroom to those applied in the practical activities, hence making the learning process more meaningful" (2019, p. 555). Linking teaching and research is considered beneficial because it increases students' understanding of the practical relevance of the field and increases critical and analytical thinking (Sumbawati & Anistyasari, 2018). This would also pave the way to support open pedagogy, in which students would curate the textbook material.

While such theoretical claims may seem reasonable, several studies have tested their reliability. Some studies applied qualitative measures to link the benefits of research with learning and were explored by scholars internationally, including but not limited to the U.S. (Healey et al., 2010; Hunter et al., 2007; Levy & Petrulis, 2011; Lopatto, 2004; Seymour et al., 2004), Australia (Brew & Jewell, 2011), Indonesia (Sumbawati & Surabaya, 2018), Mexico (Noguez & Neri, 2019), U.K. (John & Creighton, 2011), Germany (Wessels et al., 2020; Thiem et al., 2023), Southern Ecuador (Espinoza-Figueroa et al., 2021), Australia and Finland (Bower & Akpinar, 2024). Student and faculty surveys and interviews were used as instruments. In a project explored by Seymour et al. (2004) and Hunter et al. (2007), students, who were enrolled in a summer research program and were interviewed ex-post, expressed benefits in professional gains, clarity in career plans, and various other skills. Lopatto (2004) ran an online survey on 41 undergraduate institutions and reported that students perceived the benefits of their research experience, such as clearer plans and increased interest in postgraduate education. Levy and Petrulis (2011) interviewed 29 students throughout their four years of undergraduate in arts and humanities and social sciences to explore students' expectations and understanding of research. Ikhsan et al. (2019) found an increase in students' attitudes and critical thinking in environmental courses using students' perceptions through surveys and interviews. More recently, Pourhejazy and Isaksen (2024) found a positive impact of RBL choice incorporated into the undergraduate curriculum. Also, Bowyer and Akpinar (2024) after interviewing four faculty and several students from two universities in Australia and Finland, found that despite the challenges and difficulties in adopting RBL, its impact was valuable in preparing students for professional careers.

Other researchers used surveys to measure self-perceived improvements from RBL impacts. Using observations from 520 students in Germany, Thiem, Preetz and Haberstroh (2023) found that there was a statistically significant

increase in the student self-reported impact on RBL. However, this study uses self-perceived performance rather than actual performance. Hakim et al. (2021) explored qualitative and quantitative measures to find a positive effect on the experimental group of 20 students compared to the control group of 23 students enrolled in mathematics. They found statistical differences between the two sample groups suggesting that RBL implementation improves proving skills in mathematics.

Researchers also used quantitative measures to assess the effectiveness of adopting RBL. For example, using assignment grades earned by students enrolled in the Entrepreneurship and Innovation course adopting RBL, Camacho et al. (2019) found an increase in academic achievement. However, they found no difference in intentions to do research and motivation. Wessels et al. (2020), who ran a study on 952 students enrolled in social science courses in German universities, found a decrease in student motivation and joy from participating in RBL. The findings showed that factors that could have contributed to this decrease in joy and motivation could have been students' perception of a lack of faculty interest in their work and relevance to their future careers. Another recent study by Mayolo-Deloisa and Aguilar (2019) showed higher grades for students enrolled in an integrated course of Enzymology that applied research-based learning compared to the traditional format. However, such differences seemed to disappear when research-based integrated courses were compared to courses with laboratory, which seem to be more applicable in biological courses. The RBL literature has shown its positive impact on student academic performance, but most of such findings are based on students enrolled in natural science courses where most research experience is structured in the laboratory. There is a scarcity of research on the application of RBL in social sciences, especially economics, and in courses. The closest study that covers social science courses is that of Wessels et al. (2020), but it only includes educational science, psychology, sociology, political science, and communication fields of study. There is no indication that outcomes would carry across disciplines, which begs the need for discipline-specific outcomes. This article contributes to the RBL and OER literature by analyzing the effectiveness of RBL in the specific discipline of economics by adopting OER materials instead of commercially printed textbooks.

Furthermore, the sections of courses in this study also incorporated OER materials in place of commercial textbooks. The adoption of the OER course content was executed to provide equitable access to course material for all students by abolishing cost barriers. The replacement of course content with OER material rather than commercial textbooks has found opponents as well as proponents. Opponents of OER adoption claim a decrease in the quality of material would affect student learning and performance. However, many empirical studies have found no significant difference in student academic performance in various disciplines (Cummings-Clay, 2020, Engler & Shedlosky-Shoemaker, 2019; Lawrence & Lester, 2018; Lovett et al., 2018; Croteau, 2017; Kelly & Rutherford, 2017; Ozdemir & Hendricks, 2017; Allen et al., 2015; Hilton et al., 2013; Wiley et al., 2012). Other evidence-based studies have shown that using OER material may have a positive influence on student performance and withdrawal rates (Griffiths, Mislevy, & Wang, 2022; Green & Davis; 2017, Wiley et al., 2017; Fischer et al., 2015; Robinson et al., 2014; Gil et al., 2013; Pawlyshyn et al., 2013; Feldstein et al., 2012; Hilton & Laman, 2012). In addition to academic performance, faculty and students have shown a positive perception of the efficacy of using OER material as shown by other studies from Tila (2023); Tila and Dawn (2022) and Bliss et al. (2013).

In addition to the discipline-specific findings, another important contribution of this study is the use of a new indicator, growth mindset, to assess the benefits of RBL and OER. The classification of a mindset into growth and fixed was pioneered by Carol Dweck (1999, 2006). One is considered to have a growth mindset when viewing intelligence as changeable and that is advanced through practice. On the other hand, one is considered to have a fixed mindset when viewing intelligence as an inborn capability and unchangeable. Because of the belief in a changing intelligence, people with a growth mindset are less likely to be deterred by failure and would continue to practice and learn, in so increasing their chances of succeeding (Dweck & Legget, 1998; Yeager & Dweck, 2012). Shifting students' mindsets into a growth mindset appears to be a desirable outcome as it may increase the probability of future success. Limeri et al. (2020) surveyed 875 students and found that mindset is affected by various factors, one of which is academic experiences. Hence, a growth mindset may be a desirable goal for long-term student success, and it seems that it may be nurtured and encouraged through academic experience. Would research-based learning experience affect a growth mindset? Hence, this study uses a growth mindset profile to assess whether students exposed to RBL have a higher growth mindset profile than the ones who did not.

Using growth mindset profile, course, and exam grades, the analysis was not able to show any statistical difference between students who conducted research and the ones who did not. These results could support prior claims that the effectiveness of research-based learning lies in its wide implementation throughout the program rather than a specific section (Healey, 2005a). These findings encourage further research in focusing on the design of assignments, research, and other coursework to engage students.

2. Method

The section describes the design, instruments, and tools used to collect data, and the limitations.

2.1 Design

This study was conducted on 108 students enrolled in the Principles of Macroeconomic courses at City University of New York (CUNY) Kingsborough Community College during Spring 2018 and Spring 2019. Principles of Macroeconomics is a core curriculum course for most of the Department of Business AAS program degrees at CUNY Kingsborough Community College and an elective for other majors. Of 108 participants, 47 students were enrolled in Writing Across the Curriculum (WAC) sections which implemented research-based learning, known as the experimental group. The other 61 students were enrolled in traditional format sections, known as the control group. All sections were taught by the same instructor.

Quantitative methods were applied to explore this increasingly important and internationally wide question in education of whether a student-centered teaching format that integrates student research increases performance measured by assessment grades, course grades, and growth mindset. Research-based learning was implemented in the WAC sections. As McLeod (2000) and Martineau-Gilliam (2007) pointed out, the goal of WAC implementation is to help students not just with writing, but also acquiring a deeper understanding of the subject. Hence, these WAC sections were chosen to implement research-based learning whereby students followed the steps of research Bryman (2016), including literature review, research questions, data collection, data analysis, and write-up.

Students enrolled in the WAC section of Principles of Macroeconomics are known as the experimental group. At the beginning of the semester, these students were asked to engage in three stages of their research as shown in stages in Table 1. In the first stage, they participated in class informal journals which aimed at helping them find the research question. This was labeled as informal writing because it was an initial stage where students were only making use of their class lectures, textbook reading, prior experience, and critical thinking to formulate their research questions. As they were learning about economic theory, in stage 2, they would select a country of their choice other than the United States and then collect data on various macroeconomic indicators, such as Gross Domestic Product (GDP), inflation rate, unemployment rate, etc. Students would search, read, and summarize studies regarding economic theory predictions and analysis of economic performance. Having performed the literature review, students would then collect, analyze, graph, and interpret the data related to economic performance. They were asked to share these research results in online discussion forums that were accessed through their Blackboard account. During this stage, they were able to receive feedback from their peers and faculty through asynchronous online discussions. After the literature review and analysis of collected data, students would provide their findings and compare them to the traditional economic theory expectations. Any divergence would be explained, and recommendations would also be included in the final deliverable in stage 3.

Table 1. Research-based learning implementation states in the experimental group

Tasks	*Percentage*	*Objective*
Stage 1	10%	Establishing the Research Question
Informal Writing		Practice writing and develop critical thinking. Students were asked to express their understanding of macroeconomic indicators such as GDP, inflation, unemployment, etc.
Stage 2	20%	Data Gathering and Analysis
Discussion Forum		This assignment consisted of semi-formal writing. Students were asked to conduct research, collect, display, analyze, and interpret the data. This was an asynchronous discussion where students were able to receive feedback from faculty and peers.
Stage 3	20%	Concluding and Comparing Results
Drafts & Final Report		This consisted of formal writing. Students were asked to use APA Guidelines in the format of the paper, citations, and references of the sources. Students would use the data analysis and interpretations provided in the discussion forums and perform additional research to explain cases when data diverged from theory predictions and provide explanations and recommendations for improving the economic performance of the selected country.
Cumulative	50%	

While the experimental group was comprised of students exposed to RBL, the control group was comprised of students enrolled in the same course and taught by the same faculty, but it did not require them to conduct the research processes performed by the experimental group. Both experimental and control groups adopted OER material as an alternative to commercial textbooks.

2.2 Instruments

The instruments used in this study were tests and surveys. To analyze whether student research affects student performance, the student's course grades, exam grades, as well as mindset profiles were compared between the control group, which included regular format courses, and the experimental group, which included research-based learning format. Parametric t-tests were run to investigate whether the control and experiment samples were drawn from the same population or whether RBL influenced students' academic performance. Findings are shown in the results section.

Students in the control and experimental groups were part of an IRB project that assessed their efforts in multiple submissions of online assignments and were asked to submit an anonymous survey at the end of the course to measure their mindset profile. Only 80 percent (86 students) of the participants completed the end-of-the-semester mindset survey.

The results of this article have been directly retrieved from the anonymous data collection and the analysis preparation of the "Assessing Students' Performance on Multiple Entry Assignments" project with IRB File #2016-0342. In this project, all students were given the option to resubmit online multiple-choice assignments. This option was provided throughout the sections; hence, this treatment did not affect the current findings and conclusions.

The survey comprised eight questions and used a six-point Likert scale as possible answers. Each question provided the student with six possible answers ranging from one side of the spectrum of "Disagree A Lot" (corresponding to one) to the other side of the spectrum of "Agree A Lot." Once the points are added from all eight questions, each participant would have a profile number that indicates the one's growth mindset. This questionnaire maps ten possible profiles, F5–F1 as a variety of fixed mindsets and possible profiles G1–G5 as a variety of growth mindsets. Figure 2 provides a detailed description of the ten possible mindset profiles. The points on each question were added, and each student would have a profile number that would be matched with one of the ten possible mindset profiles. These ten profiles indicate one's growth mindset. Figure 3 provides a detailed description of the ten possible mindset profiles which are categorized from fixed to less fixed mindset [F5–F1] and categorized from growth to very growth mindset [G1–G5].

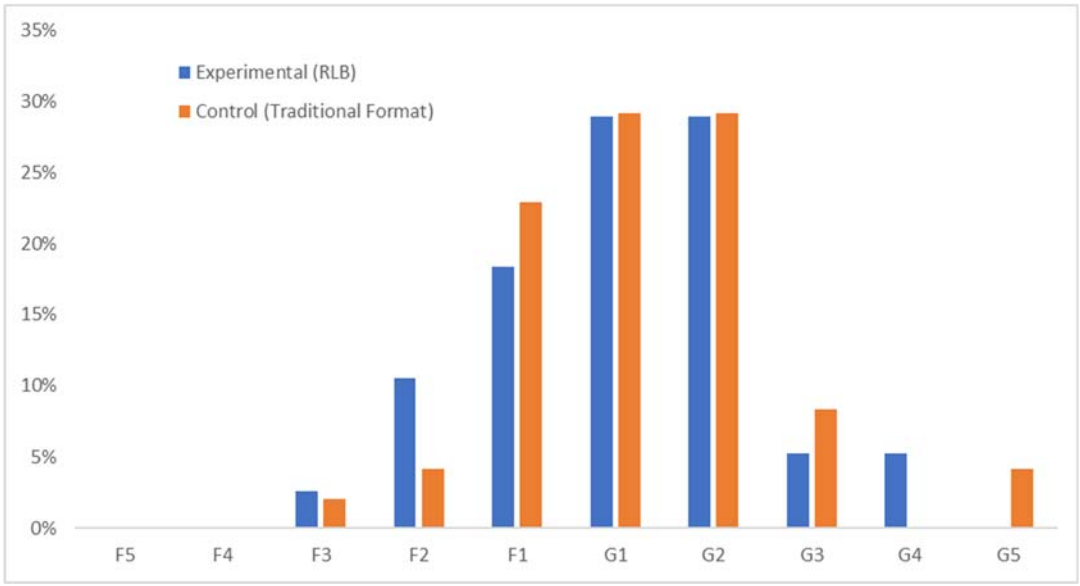

Figure 2. Format possibilities from linking teaching and research

Appendix A provides the survey questions and the description of the ten profiles as retrieved from the NYC Department of Education website on January 9, 2018. The findings from the mindset survey and grades of the control and experimental group are shown in the next section.

2.3 Limitations

Self-selection bias might be a limitation. For example, students who have higher academic abilities may self-select themselves and enroll in more challenging courses (Linn et al., 2015; Carter et al., 2016), such as WAC sections

in this study. However, such self-selection bias, even though not eliminated, is limited since a WAC course is mandatory for graduation.

Demographic, gender, race, and ethnicity data were not collected in this study. The use of these variables in segregating the data was not considered necessary as it would not provide actionable data. For example, if RBL is considered more effective on a particular gender, such a finding would not have been actionable as gender would not be used in changing or limiting students' enrollment in college courses. Therefore, the data is analyzed collectively, segregated solely by the experiment and control group.

Another limitation is the measuring dimension for establishing the RBL effectiveness. Having conducted research, students would appear to be included in a traditional grading format, and hence might not be reliably used to show differences between groups. To deal with such limitations, an additional measuring dimension was used, a growth mindset, to be able to receive student perceptions of themselves and their confidence in their capabilities.

If your profile number falls into this range:	Then your MAP (Mindset Assessment Profile) group is:	People in this MAP group usually believe the following things:
8-12	F5	You strongly believe that your intelligence is fixed—it doesn't change much. If you can't perform perfectly you would rather not do something. You think smart people don't have to work hard.
13-16	F4	
17-20	F3	You lean toward thinking that your intelligence doesn't change much. You prefer not to make mistakes if you can help it and you also don't really like to put in a lot of work. You may think that learning should be easy.
21-24	F2	
25-28	F1	You are unsure about whether you can change your intelligence. You care about your performance and you also want to learn, but you don't really want to have to work too hard for it.
29-32	G1	
33-36	G2	You believe that your intelligence is something that you can increase. You care about learning and you're willing to work hard. You do want to do well, but you think it's more important to learn than to always perform well.
37-40	G3	
41-44	G4	You really feel sure that you can increase your intelligence by learning and you like a challenge. You believe that the best way to learn is to work hard, and you don't mind making mistakes while you do it.
45-48	G5	

Figure 3. Mapping the student profile number to the profile description

3. Results

To observe whether the implementation of research-based had any effect on student performance, the grades and mindset profiles were compared between the control and experimental groups. Figures 4 and 5 show that students seem to perform similarly whether they were enrolled in a traditional or a research-based learning section, making the surprising suggestion that research did not seem to have measurable effects on student performance.

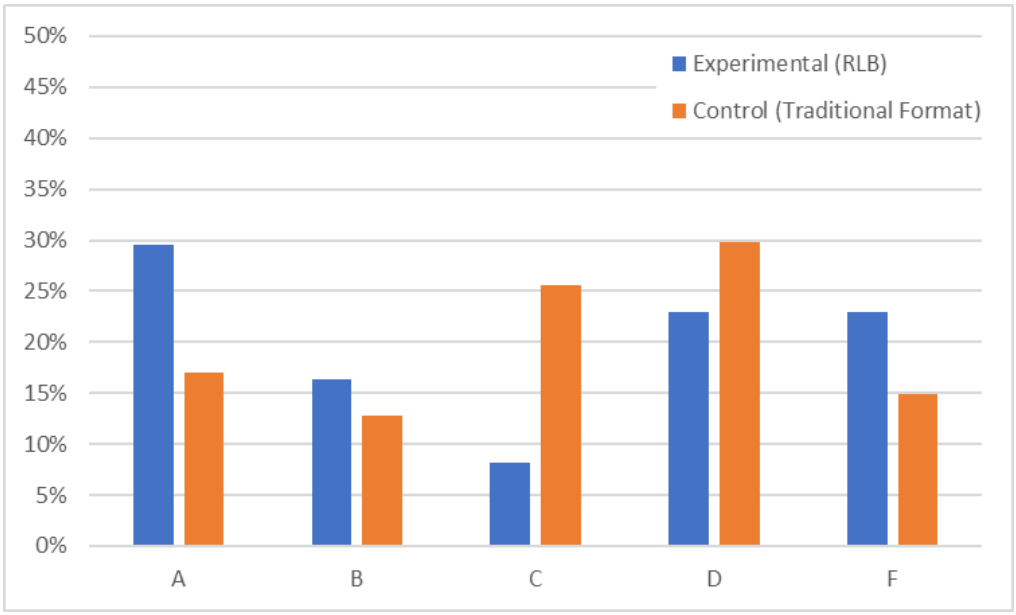

Figure 4. Frequency of final course grades earned by students enrolled in traditional format and experimental research-based learning (RBL)

Table 2 shows the conversion of student scores into letter grades of A, B, C, D, and F. Using this scale, the occurrence of such grades is captured in Figure 4. About 30 percent and 17 percent of students earned an A in the control and experimental group, respectively. The difference seems high, but it is not statistically significant as is shown later in Table 3.

More specifically, Figure 4 shows the occurrence of a growth mindset profile between the control and experimental groups. Appendix A shows the survey used to establish students' growth mindset profiles.

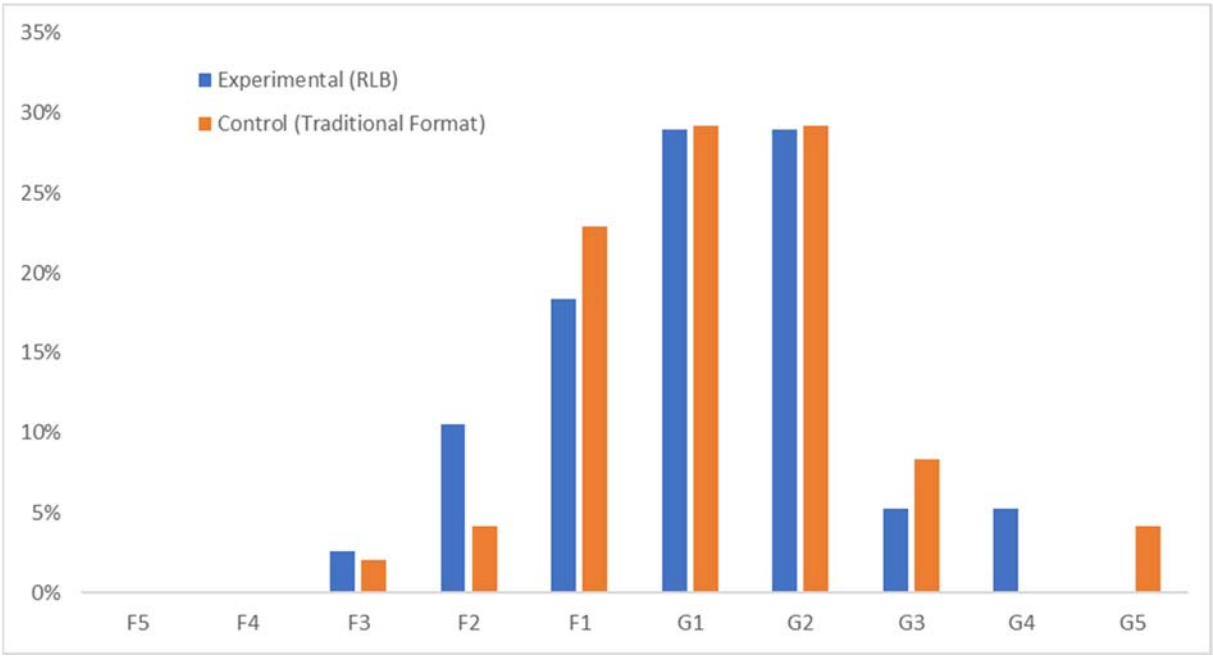

Figure 5. Frequency of profile types of students in experimental and control groups

Table 2. Letter Grade Conversion to a Score

Grade	*Explanation*	*Percentage Grade*	*Letter Grade*	*Score*
A – A-	Exceeding Standard	[90–100%]	A	5
B+ – B	Meeting Standard	[80–89%]	B	4
B – C+	Approaching Standard	[70–79%]	C	3
C – D	Below Standard	[55–69%]	C	2
F	Unacceptable	[0–54%]	F	1

To determine whether there is any statistical difference in student performance between the control and experimental groups, an ANOVA test was conducted. Table 3 shows the results of the two-sample t-test comparing final exam grades, course grades, and mindset profiles between the two groups. The comparison of the control and experimental groups assumes that the students in both groups come from the same population, meaning that at the beginning of the semester, there was no difference between the performance of the two samples. It is reasonable to assume this lack of selection bias since completing at least one WAC course is a college graduation requirement. This means that students who enrolled in WAC sections did not differ in terms of academic performance from the students who enrolled in regular format sections. Due to no student selection bias since a WAC course is a graduation requirement for all students, no instructor bias since the courses were taught by the same instructor, no seasonal bias since all data were collected during spring semesters, and no subject bias since the content of the course was the same, any differences that may be observed in student performance between the two groups at the end of the semester would be reasonably attributed to the course design difference. The only course design difference was the research-based learning implementation in the experimental group. Hence, if we were to observe a difference in the end-of-semester performance, it could reasonably be credited to the only difference between these groups: research-based learning.

Table 3. Results of ANOVA Tests

Variable	*Observations*	*Mean*	*Variance*	*P*
Types: F5 – G5 with score 1-10				
Control Group: Traditional Format	48	6.25	1.85	<0.56
Experimental Group: Research-Based	38	6.08	1.86	
Course Grades: Score F to A				
Control Group: Traditional Format	61	3.74	1.60	<0.50
Experimental Group: Research-Based	47	3.57	1.51	
Final Exam Grades: Score F to A				
Control Group: Traditional Format	61	3.07	2.53	<0.50
Experimental Group: Research-Based	47	2.87	1.72	

Note. The table shows the analysis of differences in grades and growth mindset profiles of students in control (traditional format) and experimental (RBL format) groups.

However, the high p-values that resulted from the ANOVA tests shown in Table 3 do not provide sufficient support to reject the null hypothesis that the average mindset profile, average course grades, and average final exam grades of the two samples are the same. This test fails to reject the null hypothesis suggesting that there is no statistical difference between the control group and experimental group. This indicates that research-based learning did not provide measurable effects on student performance.

4. Discussion

Research-based learning has been on the radar for pedagogical methods, and it is increasingly attracting the interest of colleges. For decades, scholars have performed qualitative analysis to establish the benefits of undergraduate research in improving students' learning, understanding, and thinking as scientists, confidence, and clarity for the future. Only very recently, have researchers turned to quantitative research in exploring this question. This study inquires on whether student research increases student learning by performing a quantitative analysis with over one hundred students enrolled in a community college during two semesters. In addition, these courses had adopted OER material as a cheaper and more equitable alternative to high-cost commercial textbooks. The effectiveness of research-based learning in an OER-adopting environment was evaluated by comparing course grades, exam grades, and mindset profiles of students enrolled in regular format sections and research-based implemented sections. This quantitative analysis did not find statistical differences between the two groups suggesting that research implemented in an undergraduate course did not provide measurable improvements in student

performance. These results could support prior claims that the effectiveness of research-based learning lies in its wide implementation throughout the program rather than in a specific section. In 2005, Healey argued that the curriculum and how it relates to the whole program is critical in providing improvements in student learning. Hence, the implementation of research-based learning in isolated courses may not guarantee learning improvement. Healey's argument may explain why this study did not show learning improvements when looking at a single course in a single semester. Longer duration and wider implementation of research-based learning throughout the program would likely provide a better estimate of its effectiveness and benefits.

These findings encourage further research in implementing and evaluating research-based learning in using OER and curating OER material by considering the duration, and wide application throughout the program rather than isolated courses and designing course assignments and research to engage students actively and effectively.

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Competing interests

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Informed consent

Obtained.

Ethics approval

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Provenance and peer review

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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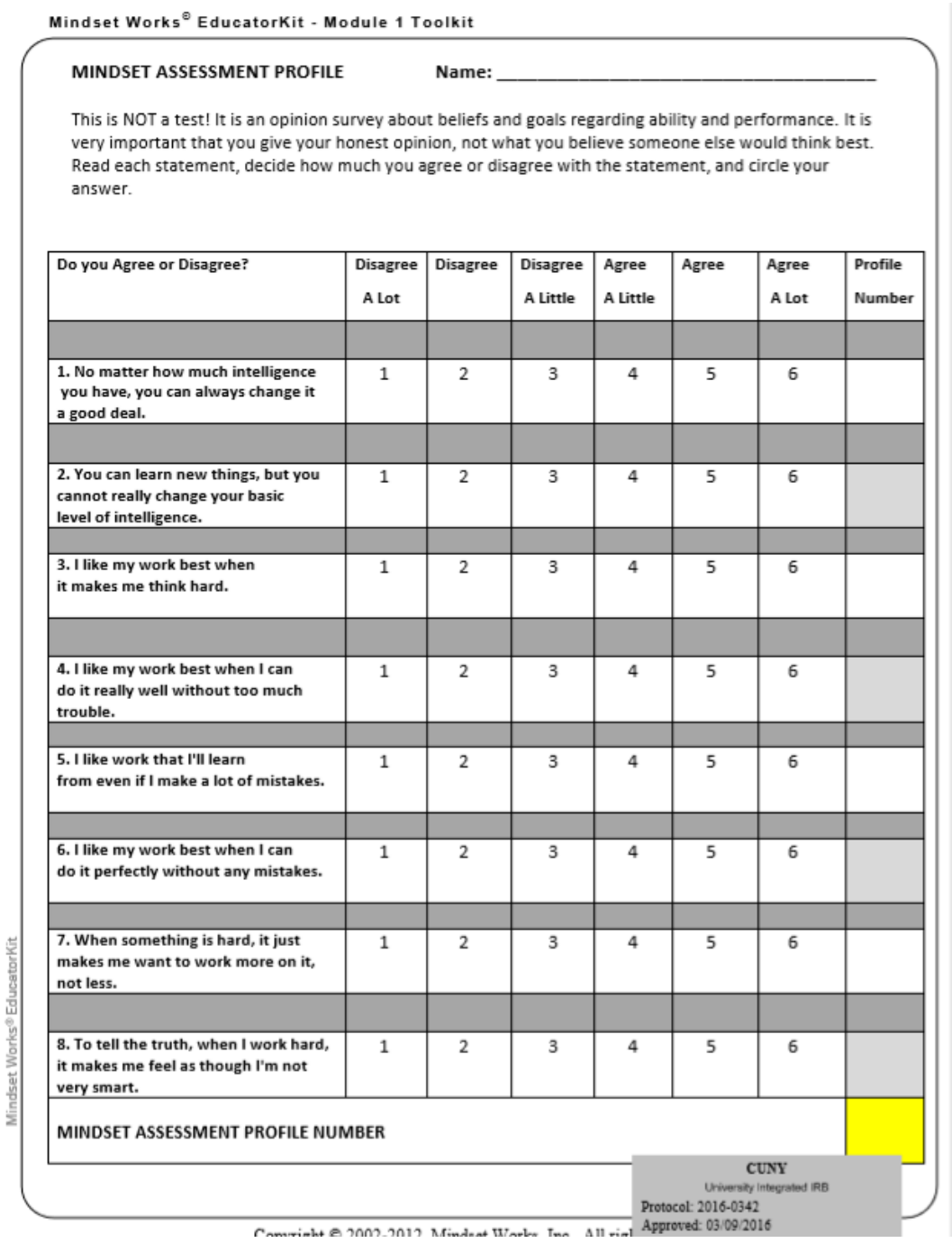
Appendix A

Mindset Profile Survey Provided by Mindset Works, Inc.



Mindset Works® EducatorKit - Module 1 Toolkit

MINDSET ASSESSMENT PROFILE **Name:** _____

This is NOT a test! It is an opinion survey about beliefs and goals regarding ability and performance. It is very important that you give your honest opinion, not what you believe someone else would think best. Read each statement, decide how much you agree or disagree with the statement, and circle your answer.

Do you Agree or Disagree?	Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot	Profile Number
1. No matter how much intelligence you have, you can always change it a good deal.	1	2	3	4	5	6	
2. You can learn new things, but you cannot really change your basic level of intelligence.	1	2	3	4	5	6	
3. I like my work best when it makes me think hard.	1	2	3	4	5	6	
4. I like my work best when I can do it really well without too much trouble.	1	2	3	4	5	6	
5. I like work that I'll learn from even if I make a lot of mistakes.	1	2	3	4	5	6	
6. I like my work best when I can do it perfectly without any mistakes.	1	2	3	4	5	6	
7. When something is hard, it just makes me want to work more on it, not less.	1	2	3	4	5	6	
8. To tell the truth, when I work hard, it makes me feel as though I'm not very smart.	1	2	3	4	5	6	
MINDSET ASSESSMENT PROFILE NUMBER							

Mindset Works® EducatorKit

CUNY
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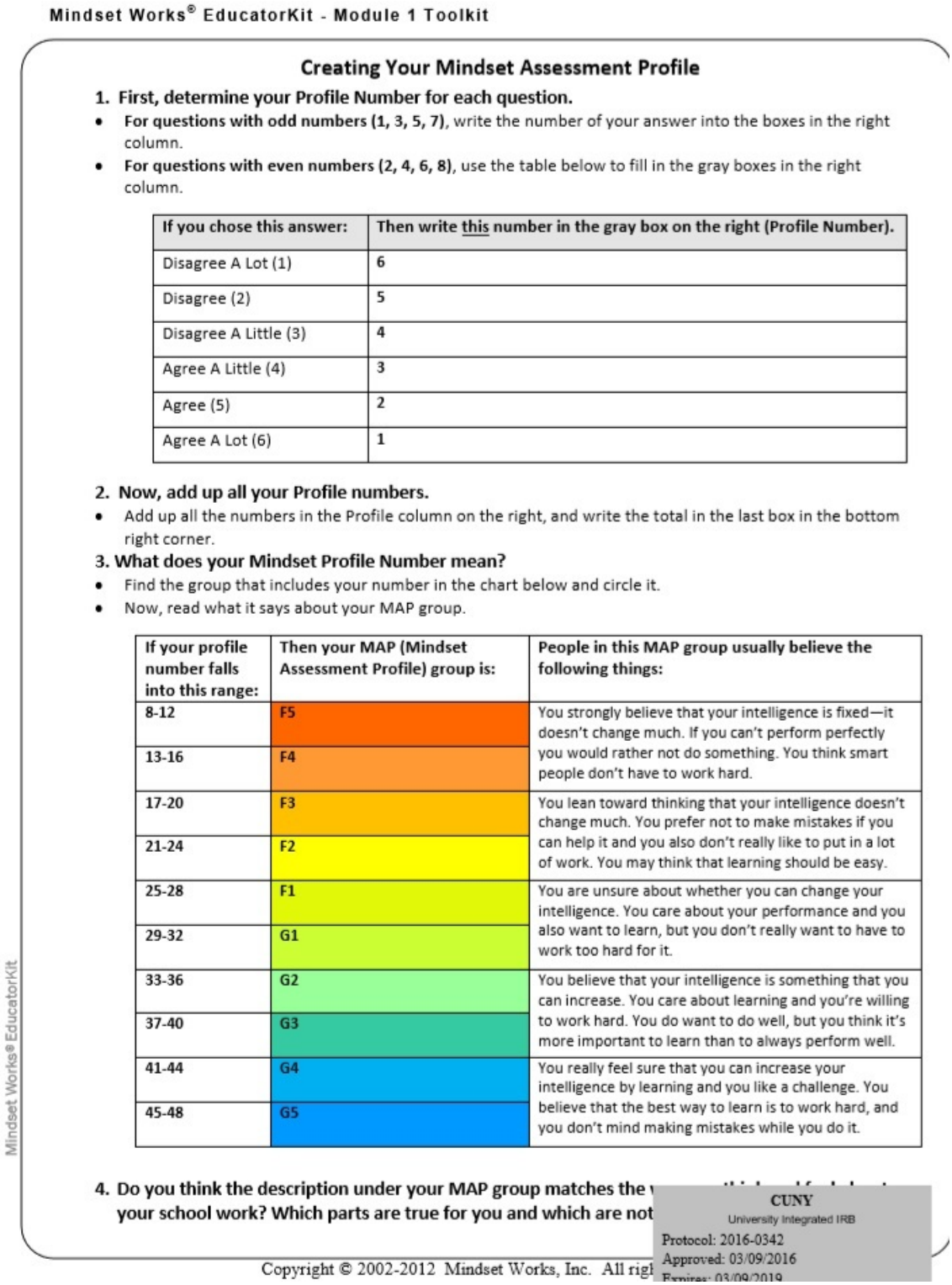
Protocol: 2016-0342
Approved: 03/09/2016

Figure 6. Page 2 of Growth Mindset Survey



Mindset Works® EducatorKit - Module 1 Toolkit

Creating Your Mindset Assessment Profile

1. First, determine your Profile Number for each question.

- **For questions with odd numbers (1, 3, 5, 7)**, write the number of your answer into the boxes in the right column.
- **For questions with even numbers (2, 4, 6, 8)**, use the table below to fill in the gray boxes in the right column.

If you chose this answer:	Then write this number in the gray box on the right (Profile Number).
Disagree A Lot (1)	6
Disagree (2)	5
Disagree A Little (3)	4
Agree A Little (4)	3
Agree (5)	2
Agree A Lot (6)	1

2. Now, add up all your Profile numbers.

- Add up all the numbers in the Profile column on the right, and write the total in the last box in the bottom right corner.

3. What does your Mindset Profile Number mean?

- Find the group that includes your number in the chart below and circle it.
- Now, read what it says about your MAP group.

If your profile number falls into this range:	Then your MAP (Mindset Assessment Profile) group is:	People in this MAP group usually believe the following things:
8-12	F5	You strongly believe that your intelligence is fixed—it doesn't change much. If you can't perform perfectly you would rather not do something. You think smart people don't have to work hard.
13-16	F4	
17-20	F3	You lean toward thinking that your intelligence doesn't change much. You prefer not to make mistakes if you can help it and you also don't really like to put in a lot of work. You may think that learning should be easy.
21-24	F2	
25-28	F1	You are unsure about whether you can change your intelligence. You care about your performance and you also want to learn, but you don't really want to have to work too hard for it.
29-32	G1	
33-36	G2	You believe that your intelligence is something that you can increase. You care about learning and you're willing to work hard. You do want to do well, but you think it's more important to learn than to always perform well.
37-40	G3	
41-44	G4	You really feel sure that you can increase your intelligence by learning and you like a challenge. You believe that the best way to learn is to work hard, and you don't mind making mistakes while you do it.
45-48	G5	

4. Do you think the description under your MAP group matches the [illegible] **your school work? Which parts are true for you and which are not**

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Figure 7. Page 2 of Growth Mindset Survey