Lessons learned from a multidisciplinary randomized controlled trial

A. Nayena Blankson, Jimmeka J. Guillory, Francesina R. Jackson,

Angelino C. G. Viceisza[1], Bruce H. Wade

Spelman College

Abstract

This manuscript discusses some of the lessons that our multidisciplinary team (spanning Economics, Education, Psychology, and Sociology) learned from implementing randomized controlled trials (RCTs) to assess the impact of metacognitive training on outcomes of Black female college students. Because our data collection is ongoing, the purpose of this manuscript is to describe the collaborative efforts required to make such a project a success and share lessons learned. Future papers will focus on the quantitative findings of the RCTs by looking at the impacts on outcomes such as metacognitive awareness, grade point average, and retention.

Keywords: metacognition, behavioral economics, interdisciplinary collaboration, randomized controlled trial, college students

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[1] Correspondence concerning this article should be addressed to: Angelino C. G. Viceisza, Economics Department, Spelman College, 350 Spelman Lane, SW, Box 167, Atlanta, GA 30314. E-mail: aviceisz@spelman.edu.

Introduction

In recent years, the value of a college degree has been increasingly questioned (Mayhew et al., 2016). There is widespread evidence that returns to education vary by demographic groups (Gunderson & Oreopoulos, 2010). For example, the career earnings premium from a four-year college degree (relative to a high school diploma) for persons from low-income backgrounds is considerably less than it is for those from higher-income backgrounds (Bartik & Hershbein, 2018). At the same time, it is unclear why such differential returns to education exist. In particular, why are some students more successful in college than others and what factors influence retention, persistence, and grade point average (GPA)? Coupled with these findings, Tinto (2005) shows that students who feel that they are learning and performing well are more likely to stay in college.

The project discussed in this manuscript seeks to complement the answer to these questions by conducting randomized controlled trials (RCTs) to assess the impact of metacognitive training on the academic and metacognitive outcomes of Black female college students. This is a particularly interesting demographic for several reasons. First, Black women are attending for-profit colleges at a higher rate than other demographic groups and given the predatory nature of many such institutions, Black women are at an increased risk of being exposed to lower quality education (Cottom, 2017). Second, to the extent that gender, race, and family background affect college performance and returns to education (Gunderson & Oreopoulos, 2010; Bartik & Hershbein, 2018; Dossi et al., 2019), Black women are likely to face multiple barriers due to intersectionality of their gender, race, and possibly socio-economic status.

Metacognition is the ability to think about and understand one's own knowledge acquisition processes (Flavell, 1976; Kuhn, 2000). To be metacognitively aware means that one is conscious of what and how one is learning. Specifically, it refers to the learner's ability to plan, monitor and evaluate the quality of learning. Students with higher levels of metacognition not only perform better in school (Tobias & Everson, 2009), but can better articulate their understanding of concepts (Rysz, 2004). Years of empirical evidence support the success of teaching students metacognitive strategies (Hacker, Bol, & Keener, 2008; Tanner, 2012). Contrary to these findings, though, is the fact that most students enter college without ever exploring their own thoughts regarding their learning processes. Moreover, college instructors often do not explicitly discuss with students the skills and mindsets required for success in college. Finally, there is limited rigorous empirical support for the effectiveness of metacognitive training on outcomes, particularly for Black female college students. Our project is an institution-wide RCT designed to test the impact of classroom instruction (RCT 1) and peer tutoring (RCT 2) in metacognitive strategies on performance and persistence among Black female college students.

This manuscript describes some of the collaborative efforts required to make a multidisciplinary project of this magnitude a success and share lessons learned. Future papers will focus on the quantitative findings of these RCTs, assessing outcomes such as metacognitive awareness, GPA, and retention (for related literature, see for example the review by Fryer 2017). In what follows, we will begin with an overview of the research project. We will then discuss lessons learned. Finally, we conclude with some brief recommendations.

Overview of Our Project

Although metacognitive instruction has been found to have positive effects on college student outcomes, not much research has examined the effectiveness of metacognitive training on outcomes for Black female college students, particularly using RCTs. The goal of our project is to address this need.

Two areas of the college experience that have been identified as contributing to retention are first year programs and learning support services such as peer-tutoring (Habley, Valiga, McClanahan, & Burkum, 2010). Intervention strategies that are targeted at first year programs and peer-tutoring services might have the potential to make significant impact on college student outcomes. Therefore, we designed RCTs that would target both first year programs and peer-tutoring. We assess the impact of metacognitive teaching (RCT 1) and peer-tutoring (RCT 2) methods on students enrolled in a signature first year course at the institution.

Briefly, the signature course is a two-semester course that all first-year students at the institution must take. The aim of the course is for students to examine major themes associated with the African Diaspora within a global context and from perspectives that are both interdisciplinary and gender-informed. Faculty share a syllabus, assign common readings, administer common assessments (e.g., map quiz and a final exam), and give common assignments (e.g., reading logs, museum audio narrative, and an artistic/performance group project). The course introduces complex concepts that are new to many students. Students are required to read academically difficult materials that often challenge their current perspectives or worldview. Yet, many students find the course interesting because it places them, as Black women, at the center of the content they are studying. That the course is two-semesters allows us to more readily track the students across their first year.

Metacognitive instruction is a low-cost, potentially high-impact intervention that requires no change to campus infrastructure, curriculum or degree programs. Infusion of metacognitive awareness training in the classroom and through peer tutors is expected to increase student metacognitive awareness and thereby have an impact on student outcomes such as retention and GPA. Based on the results of our research, we will develop tools and protocols for metacognitive instruction that can be applied in other classroom and peer-tutoring settings to better support learners and ensure their success and persistence to graduation. The first phase of the project is focused on metacognitive classroom instruction while the second phase is focused on metacognitive peer-tutoring. Each phase targets two cohorts of first-year students.

Metacognitive instruction involves a number of different strategies. The strategy used in this intervention is reciprocal teaching. While reading, the instructor teaches students how to generate questions, summarize in their own words, clarify word meanings and predict what might appear next. Instructors use a scaffolding approach. That is, they initially model the four strategies, with students gradually assuming greater responsibility, culminating with a dialogue between the instructor and student, and student and student. In RCT 2, peer tutors (called peer recitation facilitators in the project) model reciprocal teaching and reiterate the discussion that instructors cover in their classes.

Lessons Learned

During the course of implementing the project, we have learned several lessons, many of which related to inherent difficulties associated with implementing a field-based experimental study. Specifically, we encountered difficulties with: 1) ensuring that treatment faculty implemented the

intervention, 2) collecting data, and 3) adapting to institutional procedures, such as student requests for class changes.

A key lesson learned was the value of ensuring that treatment faculty implemented the intervention. To address this, we facilitated faculty meetings and offered high-impact, developmentally appropriate workshops for the treatment faculty as mechanisms to provide continual support for their adoption of the intervention strategies. This project required faculty to redirect their traditional faculty meetings from a content focus to a focus on pedagogy. Faculty were asked to examine how they were teaching the content-rich course, which covers a wide range of interdisciplinary content. In particular, treatment faculty were asked to talk about how they infused a metacognitive perspective in their instruction during the workshops. Across the semester, workshops moved from a facilitator focus to one in which the faculty taught each other about effective strategies they were using in their classes.

Throughout the course of the project, we have addressed some of the recurring concerns that treatment faculty expressed, such as needing strategies to prevent returning to "default" instruction and how to know if they are implementing the intervention correctly. For instance, faculty complete bi-weekly surveys in which they explain how they implemented the intervention each week, which serves as a reminder and prevents them from returning to their default strategies.

We also developed a college classroom quality observational rating measure for use on the project. To date, although there are instruments for assessing classroom quality in early childhood to secondary school environments, there is a paucity of instruments for assessing college classroom environments. We held training sessions and trained raters to 80% reliability. The development of the college classroom observation measure has allowed us to better assess

the fidelity of the intervention. Analyses of classroom observation data suggest that treatment classrooms displayed more metacognitive strategies in the classroom compared with control classrooms, affirming the fidelity of the intervention (Murphy & Gutman, 2012).

An additional lesson learned was the importance of being adaptable, which related to collecting consent forms and data. For example, our initial strategy for obtaining consent from all first-year students (target sample size of approximately 500) was not successful. More specifically, in the first year of the grant, we met with all first-year students during their orientation session the week before classes started with the anticipation that all students would attend the session and we would have the greatest likelihood of securing consent. This did not prove to be the case. Some students did not attend the session and more importantly, there were technology challenges that prevented some students from logging into the online consent form. Based on this experience, for the second year of the grant, we modified our process to increase response rates. Foremost, we developed a video explaining the purpose of the project. This video was sent to students, along with a link to the consent form, prior to their arrival on campus. This led to higher initial response rates from students than did our group meeting with students the previous year.

Another lesson learned was also associated with the collection of data during the fall semester of the first year of the project. Specifically, as with the consent forms, our initial process was not successful and had to be modified. We derived several strategies to address the consent and data collection challenges, some of which were short-term strategies and others long-term. For example, class syllabi were modified to list the data collection dates on the syllabus so that students would have class time to complete questionnaires, rather than leaving it up to students to complete the questionnaires at their leisure. Implementation of these strategies

proved successful. For example, response rate was 96% and 89% for the fall and spring data collection, respectively because of modifications to initial strategies. A failure to implement a more structured format for administering the surveys, would have resulted in a meager response rate.

A final lesson learned was the power of working collaboratively with campus administrative units. This lesson related to ensuring that students remained in their assigned condition (treatment or control). Inherent in this is the need to adapt research procedures to college practices, which is best illustrated when students request to change the class to which they were assigned. For the targeted course, in the past, the College Registrar assigned students to specific class sections. Students could readily modify their class by going to the Registrar if a scheduling conflict occurred. However, our project requires students to remain in their assigned condition. Therefore, to allow students the opportunity to change classes while also remaining in their assigned condition, we secured permission from administrative offices at the institution to be the sole arbitrator of managing student schedules to make sure that they remained in their randomized assignment categories for the targeted course. We worked closely with the Registrar to ensure that students were placed in classes that fit their randomly assigned condition.

Although we have encountered several challenges, we have been able to resolve them, resulting in (1) ensuring that treatment faculty use intervention strategies consistently and correctly, (2) successfully collecting data in a timely manner, and (3) resolving students' scheduling conflicts while ensuring that they remain in the condition to which they were assigned. We attribute much of the success of the project thus far to the willingness of various campus units to work cooperatively with the project. Moreover, the liberal arts nature and mission of the institution are consistent with rigorously understanding how best to improve

student outcomes. So, it may be more difficult to implement a project of this type at a different kind of institution.

Conclusion

In conclusion, as is to be expected, we have faced challenges in implementing college-wide RCTs to assess the impact of metacognitive training on student outcomes. However, we have managed to overcome them, with the support of several constituents on campus. This manuscript discusses some of the lessons learned, in an effort to inform those who want to implement RCTs of this type at their own institution or organization.

Our main recommendations are to (1) work closely with all relevant stakeholders (internal and external), (2) communicate frequently, both among the research team and with stakeholders, and (3) be willing to adapt research protocols, as long as the major aspects of the design are not compromised.

Acknowledgement

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