

## Does It Matter If I Call It a CURE? Identity Development in Online Entrepreneurship Coursework

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### Abstract

Course-based undergraduate research experiences (CUREs) have historically been associated with STEM, but are expanding into other fields. CUREs may benefit undergraduate business majors, but some students do not perceive “doing research” as part of business. The authors ask whether a business CURE can lead students to begin self-identifying as researchers. Particular attention is paid to explicitness: Do students report different self-identification outcomes if they are explicitly told they are doing research? Survey data are collected from a required entrepreneurship course in which an instructor explicitly talks about her research career and authentically characterizes normal course activities as “scientific research” in some course sections but not in others. Pre- and post-course surveys show statistically significant growth in student self-identification as researchers only in the “explicit CURE” sections.

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Undergraduate research experiences can have many benefits for students in terms of institutional outcomes, such as grades and retention (Bhattacharyya and Chan 2021) as well as affective outcomes (e.g., Cuthbert, Arunachalam, and Licina 2012; Hensel 2018; Lenhardt 2014). However, extracurricular research opportunities typically require students to actively seek out these opportunities, which can be relatively scarce. Given these constraints, course-based undergraduate research experiences (CUREs) are

an increasingly popular approach to expanding access to participation in research to a wider student population (Banger and Brownell 2014).

Most of the extant research on CUREs focuses on STEM fields (Haeger et al. 2020). However, there also have been attempts to implement CUREs in business education (Bouldin et al. 2015; Rivera and Groleau 2018). Business is the largest undergraduate major in the United States, with over 386,000 graduates in 2017–2018 (NCES 2022). Unfortunately, students studying business typically have lower rates of participation in undergraduate research than in other disciplines, perhaps because of a lack of research opportunities in business departments or because many business students do not perceive connections between “research” and “business” (Douglass and Zhao 2013; Mathis et al. 2015; Stöblein and Kanet 2016). CUREs in business schools could extend the benefits of research experiences to a vast new student population.

Given some students’ perception that research is unconnected with business, it may be particularly important to address the issue of identity and identity development, which help confer the benefits of CUREs (Auchincloss et al. 2014). When students begin to associate themselves with a particular identity, that self-identification may promote adaptive behaviors and persistence in the domain (Estrada et al. 2011). Recent studies also have begun to explore how CUREs support identity development. Cooper and her colleagues (2020) find that students who collect and analyze their own data show greater growth in scientific identity than those who analyze data collected for them by professional scientists. However, much remains unknown about the ways CUREs support identity

development. In this study, an undertheorized aspect of CURE pedagogy is examined: how an instructor might influence students' identity development by explicitly calling out course activities as "research."

## Identity Development

This study applies a three-part framework originally developed to analyze students' racialized academic identity development in K–12 settings. Nasir (2012) argues that students construct identities in school using material, relational, and ideational resources. Material resources might include physical resources, challenging curriculum, and knowledgeable instructors. Relational resources arise from the ways that students are treated by educators and institutions (e.g., being discursively positioned as a "good student" or a "researcher" by one's instructors). Ideational resources come from narratives and stereotypes about what it means to be a particular type of person; if students can personally relate to narratives of "good students" or "researchers," students can construct identities by imagining these narratives as possible futures for themselves.

Entrepreneurship courses could provide many of these resources. Materially, they meet the criteria of a CURE as hypothesized by Auchincloss and colleagues (2014): (1) student use of scientific practices such as asking questions, posing hypotheses, collecting data, and conducting analyses; (2) discovery, in which students explore a question with an answer unknown to both themselves and the instructor; (3) collaboration, involving students working in groups; (4) broader relevance, meaning research activities have implications beyond the classroom; and (5) iteration, requiring students to conduct inquiries repeatedly and learn from each iteration. (For further discussion and occasional critiques of these criteria, see Ballen et al. 2018; Corwin et al. 2015; Corwin et al. 2018). Entrepreneurship classes are often based on the lean startup method (LSM; Blank 2013), which typically assigns students to work in teams (criterion 3) to develop an original business idea from scratch (criterion 2) that, ideally, could be pursued beyond the classroom (criterion 4). A key feature of LSM is data collection (criterion 1) through repeated cycles of feedback from potential customers (criterion 5). Obtaining this feedback helps address a common source of failure among entrepreneurs: mismatch between what an entrepreneur thinks a customer needs and what a real customer actually needs. This process of "customer validation" can be formalized as an application of the scientific practice of hypothesis testing (Camuffo et al. 2020).

Entrepreneurship courses employing LSM provide a rigorous curriculum—a key material resource for student identity development. Such courses also differ from previous CUREs in business education, which have often focused on incorporating STEM content into business courses rather than explicitly framing business activities as a form of

research (Bouldin et al. 2015; Rivera and Groleau 2018). By contrast, LSM courses involve conducting research projects situated within the field of business without necessarily utilizing STEM content. Instead, they explore business content using epistemological practices often associated with science, such as hypothesis testing and falsification (Popper 1963). Of course, other epistemological practices play important roles in science as well; for discussions of some, see Harding (1992), Kuhn (1970), and Medin and Bang (2014). Here, the focus is limited to hypothesis testing and falsification, as these epistemological practices play a prominent role in LSM.

In addition to material resources for identity development, relational and ideational resources also could be supplied by entrepreneurship instructors. Some scholars have stated that instructor explicitness about "research" is an important feature of CUREs (Kinner and Lord 2018), but this explicitness has not been theorized as an essential element of CUREs. This research proposes that if CURE instructors explicitly tell students they are engaging in research, and behave in ways that sincerely position students as creators of new knowledge, this discursive act is a relational resource that helps students build identities as researchers. Furthermore, if instructors provide examples of what it means to "be a researcher" in parallel with CURE course activities, these stories could serve as ideational resources that further support identity-building. On the other hand, if students are not explicitly recognized as doing research by their instructor, or are not exposed to relatable narratives of "doing research," then CURE participation might not result in the same degree of identity-building, since students would have access to material resources but not to relational or ideational resources.

## Study Design

These issues were explored by studying an LSM course that is required of all undergraduate business majors at California State University, Monterey Bay, and is typically taken in the fourth year. Since it is required, there are no selection effects that would suggest these students differ from other business majors; however, it is noted that the sample is limited to students who have already persisted for several years in the business major.

The question is whether explicitly characterizing course activities as scientific research promotes student self-identification as researchers. A quasi-experimental design in which a single instructor taught two sections, one as an "explicit CURE" and the other as an "implicit CURE." Both sections completed virtually identical learning activities and assignments, except for a single course activity about halfway through the semester focused on "customer validation." In the implicit CURE, students were given the standard assignment, that is, to interview prospective customers about their proposed product. In the explicit

**TABLE 1. Coding Scheme for “Do you view yourself as a researcher? Why or why not?”**

Code	Value	Example 1	Example 2
Yes, definitely	5	Most definitely.	Yes, because I have the skills to perform quality research. Plus, anyone can be a researcher!
Yes, maybe	4	Yes, but only when told.	In a sense. Every class I have taken here at CSUMB has pushed me to do some type of research. It has helped me to better understand data and information presented.
Not sure	3	I feel that I enjoy interactions with individuals in person, but I believe I have a stronger skill set in a work environment where I have to manage situations.	Need research to carry out sound plans.
No, maybe	2	I do not because I think of data and looking up answers and I don't think that I do that.	At the moment, no. I do research on my own company, but to the level of those who dedicate their lives to research, I do not conduct that level of study.
No, definitely	1	No. I do not like asking people questions, collecting information, or analyzing data.	No, I do not have an interest in it.

CURE, students were first instructed to list assumptions they had made and to propose hypotheses they would like to test in their interviews. In addition, the instructor explicitly referred to this activity as research and explained Auchincloss's (2014) five components of CUREs to students. The instructor also described examples of her own research experience to the explicit CURE section on approximately three occasions during the semester, and focused on the iterative nature of scientific research (and entrepreneurship). Two iterations of the quasi-experiment were conducted during successive semesters, in fall 2020 and spring 2021. In both semesters, instruction was online-only due to the ongoing coronavirus pandemic.

### Data Collection

This project was conducted at California State University, Monterey Bay (CSUMB), a midsize public four-year Hispanic-serving institution. The institution serves over 6,000 undergraduates, approximately 51 percent of whom are first-generation undergraduate students and nearly one-third of whom come from low-income families. During the semesters this study was conducted, approximately 45 percent of CSUMB students identified as Hispanic or Latino, 29 percent identified as White, and 26 percent identified with another racial or ethnic identity or with more than one.

Many CUREs are taught regularly at CSUMB, but nearly all are outside the College of Business; the authors are aware of only one other business CURE at the institution in addition to the one described in this study. Pre- and post-course surveys in CUREs are conducted regularly to assess ongoing curricular changes. Students provide informed consent during the administration of these surveys. Pre-course surveys collect demographic information and baseline information about students' career goals, prior research experiences, and

self-identification as researchers; post-course surveys are more extensive and collect information about self-identification as a researcher, as well as student experiences in (and perceived outcomes of) CURE coursework.

The analysis focuses on four constructs: students' identity as researchers, the number of prior research experiences they have had in undergraduate courses, their experiences of CURE pedagogy or “discovery” in the entrepreneurship course, and their sense of ownership or investment in their entrepreneurship research projects. The first dependent variable, identity as a researcher, was measured through an open-ended survey item on pre- and post-course surveys asking students: “Do you view yourself as a researcher? Why or why not?” (It is noted that this question is somewhat different from others that focus on developing students' understanding of scientific practices and ways of thinking, e.g., McCune and Hounsell 2005, and on science identity as a matter of community and networking, e.g. Hanauer et al. 2017.)

Magnitude coding was used to analyze and quantify the open-ended responses (Saldaña 2012; Weston et al. 2001). Converting qualitative text data into quantitative statements about identification or lack of identification with a particular identity is not uncommon in social science research (e.g., Sylvan and Metskas 2009). However, it is recognized that quantifying data in this way results in a loss of some of the rich detail of the qualitative responses. One of the coauthors and a student researcher read all responses from the fall 2020 data (82 text strings) without knowing which section each response came from or whether responses came from the pre- or post-course survey. Responses were coded using a five-point scale, as shown in Table 1. Inter-coder reliability for the fall 2020 data was 73 percent. When the

**TABLE 2. Sample from Two Semesters, Academic Year 2020–2021**

	Fall 2020		Spring 2021		Total
	Explicit CURE	Implicit CURE	Explicit CURE	Implicit CURE	
Total enrollment	37	36	24	26	123
Pre-course survey	26	20	19	15	80
Post-course survey	17	19	8	14	58
Both surveys	12	16	8	11	47

same codebook was used by the same pair of coders for the spring 2021 data, inter-coder reliability was 84 percent.

Students' prior research experiences were measured with a Likert-type question on a three-point scale in the pre-course survey. Students identified whether they had conducted "zero" prior projects (coded as 0), "one or two" (coded as 1), or "three or more" research projects (coded as 2) in their prior coursework.

Discovery, a key element of CURE pedagogy, was measured using items adapted from the Laboratory Course Assessment Survey of Corwin and her colleagues (2015). This instrument includes Likert-type items with values ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Items include such statements as, "During this research project, I was expected to: Formulate my own research question or hypothesis to guide an investigation." One item that was science-specific was modified to fit a business education context: "During this research project, I was expected to: Generate novel results that are unknown to the instructor and that could be of interest to the broader *business* community or others outside the class." Discovery was measured only on the post-course survey. Five discovery items were summed for a single score.

Participants' sense of ownership of their research projects also was measured using five modified items from the Undergraduate Research Student Self-Assessment (URSSA; Weston and Laursen 2015). The URSSA is a measure of self-reported student gains rated on a five-point Likert scale ranging from 1 ("No gain") to 5 ("Great gain"). For the post-course survey, the URSSA items were rephrased to focus on business rather than science, for example, "During your most recent research experience, how much did you: Try out new ideas or procedures on your own? Feel responsible for the project? Feel your data collection contributed to a *business* community?" Five ownership items were summed resulting in a single score.

The discovery, ownership, and prior research experience variables would all be expected to affect student identity based on the Nasir (2012) framework cited above. Experiences of discovery may provide students with high-quality

curriculum that contributes material identity resources to students, and perhaps even some relational resources (if students are positioned as "researchers" by their instructors or peers) or ideational resources (if students develop mental models of what "being a researcher" looks like). Sense of ownership also might reflect students' acquisition of relational resources (e.g., feeling like one's data collection "contributed to a business community" might reflect a feeling of membership or affiliation with that community). Finally, if students already have had course-based research experiences, they already may have access to the material, relational, and ideational resources provided by a CURE. One might expect that any growth in students' self-identification as researchers during a CURE might be attenuated among students who already have had similar experiences.

Table 2 reports the number of responses obtained for two semesters. There was greater attrition of survey responses in the explicit CURE section; however, students in the explicit CURE who completed only the pre-course survey did not show significantly different self-identification than those who completed both the pre- and post-course surveys. Students who completed only the first survey reported slightly higher initial identification as researchers compared with their classmates who completed both surveys, but all differences were small (Cohen's  $d < 0.2$ ), with  $p$  values above 0.6. In the analyses that follow, only the matched pre- and post-course survey data ( $N = 47$ ) are used.

## Results

Effects were similar in size and direction for both semesters, so data from both semesters were combined to calculate effects. Violin plots were used (Figures 1–3), which provide more direct information about the data than conventional bar and line graphs (Weissgerber et al. 2015). Figure 1 shows that in the implicit CURE, the most common experience was no change to student self-identification as researchers, with a similar number of students experiencing an increase and decrease. By contrast, in the explicit CURE, virtually all participants who did report a change reported an increase in self-identification as researchers. In fact, in the explicit CURE, the second-most common change was a dramatic increase in self-identification as a researcher (an increase of four points on the five-point scale).

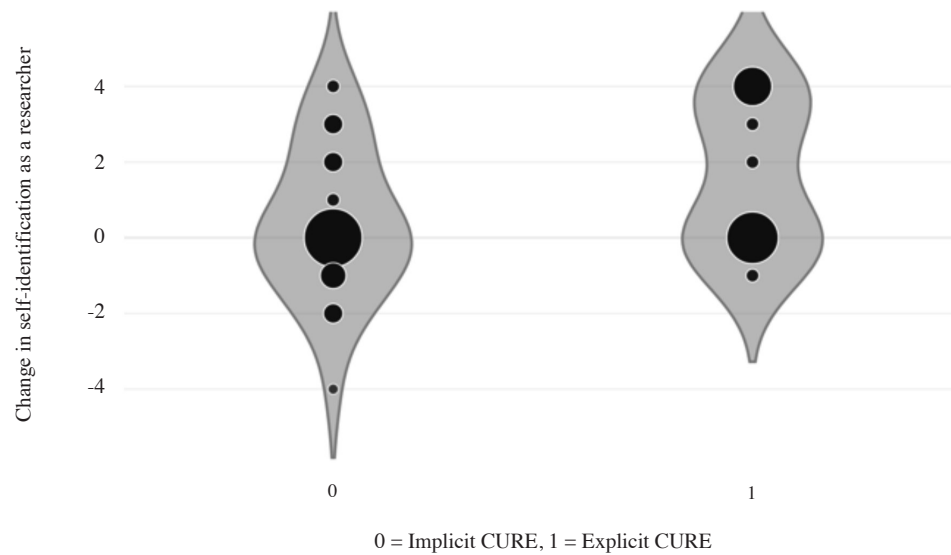
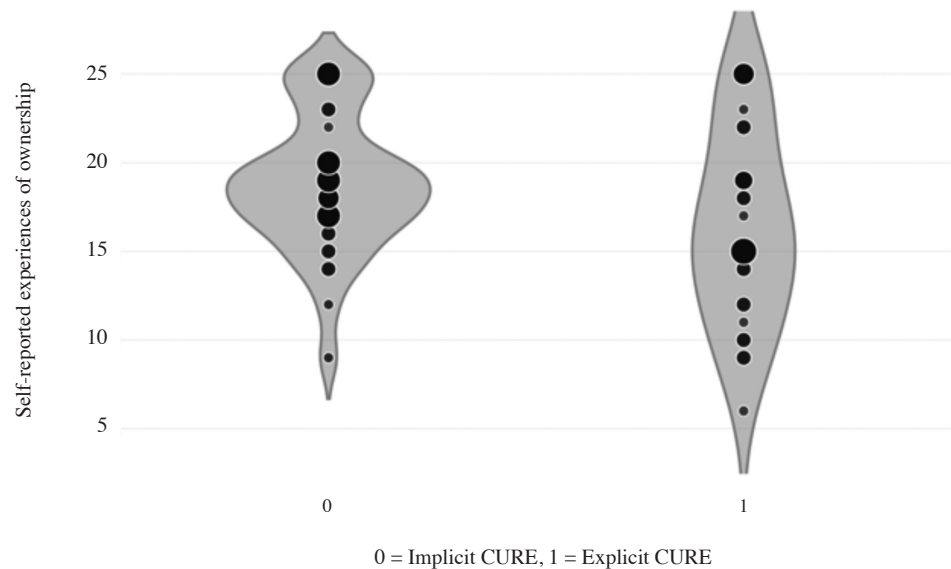
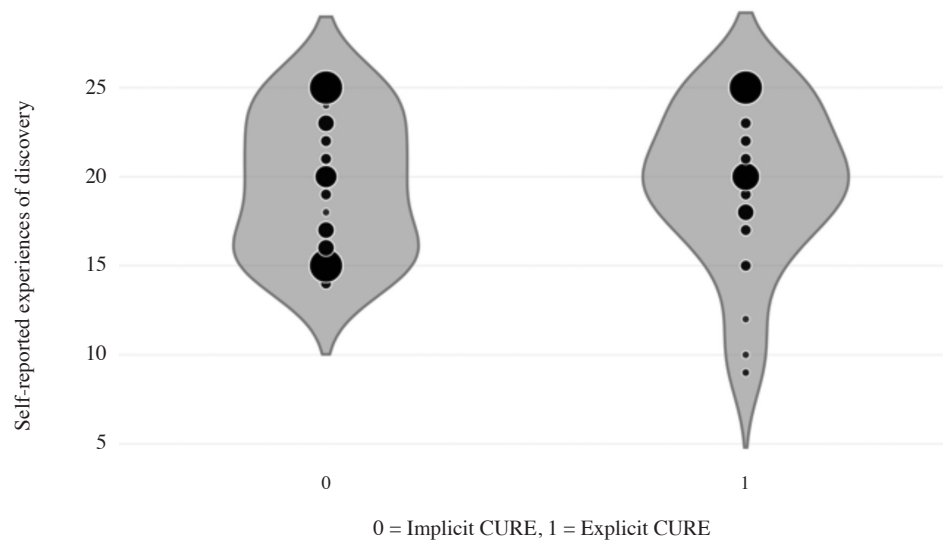
**FIGURE 1. Change in Self-Identification as a Researcher in Implicit and Explicit CUREs****FIGURE 2. Self-Reported Experiences of Ownership in Implicit and Explicit CUREs**

Figure 2 shows students' self-reported experiences of ownership on a scale ranging from 5 (few or no experiences of ownership) to 25 (many experiences of ownership). In this case, students in the explicit CURE showed a wider range and, on average, a slightly smaller number of experiences of ownership. This difference was not statistically significant but seemed intriguing, as will be discussed.

Figure 3 shows that participants in the explicit CURE reported a wider range and, on average, larger number of experiences of discovery than participants in the implicit CURE.

The relationship between self-identification as a researcher and participation in the explicit CURE is estimated using ordinary least squares (OLS) regression analysis. The effect of covariates that also might affect the self-identification variable—including students' prior research experiences, experiences of ownership over their research projects, and their experiences of discovery in the course, were then estimated.

$$\text{ResearcherID} = \alpha + \beta_1 \text{ExplicitCURE} + \beta_2 \text{PriorResearch} + \beta_3 \text{Ownership} + \beta_4 \text{Discovery}$$

**FIGURE 3. Self-Reported Experiences of Discovery in Implicit and Explicit CUREs**

The basic model (Table 3, model 1) relates the explicit CURE and self-identification as a researcher and shows a positive and significant coefficient. Models 2, 3, and 4 add additional variables without appearing to substantially change the coefficient from model 1. The negative coefficient on the number of previous research experiences in models 2 and 5 is intriguing, suggesting that students with fewer research experiences gain more in self-identification as researchers than those with more experiences; this finding is consistent with some of the hypotheses mentioned above. Experiences of ownership over one's entrepreneurship project appear to have a negligible effect on self-identification as a researcher, whereas experiences of discovery appear to have a positive (albeit nonsignificant) effect.

## Discussion

There is evidence that students in the explicit CURE showed statistically significant growth in self-identification as researchers when compared with students in the standard LSM course. There also is evidence that the explicitness of the CURE may have made a separate contribution to students' development of a researcher identity, beyond that of merely experiencing CURE pedagogy (operationalized as discovery). On the other hand, experiences of ownership over one's research project seemed to have a negligible impact on students' development of a researcher identity.

These findings are largely consistent with Nasir's (2012) framework, which suggests identity development is supported not just by material resources but by relational and ideational resources as well. The study findings suggest that using CURE pedagogy may provide students

primarily with material resources, and explicitly and authentically calling students' actions "research" may provide additional relational resources. Describing career pathways that feature research may provide additional ideational resources by explicitly giving students narratives or mental images of what research might look like in their discipline.

Another potential contribution to business education is suggested by the difference in the distribution of ownership experiences (Figure 2). This effect was largely driven by one survey item: students in the explicit CURE reported fewer experiences of "feel[ing] responsible for the project" during the semester. At first glance, this may seem like an undesirable outcome. However, there is an alternative (and more positive) interpretation of this effect. It is posited that when customer validation activities in the explicit CURE are framed as "hypothesis testing," students might engage in a process of epistemic distancing—the practice of distancing oneself from an idea when one expects the idea may be challenged or even disproven. Epistemic distancing is often achieved through hedging (Conlin and Scherr 2018), and in science education it is sometimes considered a positive phenomenon because it can support student engagement in argumentation. In essence, students may be better at recognizing flaws in "an idea" than in "my idea." The practice of epistemic distancing may be useful in entrepreneurship education if it helps students avoid becoming so enamored with their own ideas that they fail to critically compare them with the needs of real customers. Epistemic distancing could help mitigate some of the cognitive biases that have been identified in critiques of the lean startup model (York and Danes 2014).

**TABLE 3. Effects of CURE on Self-Identification as a Researcher**

Independent variables	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)	Model 3 $\beta$ (SE)	Model 4 $\beta$ (SE)	Model 5 $\beta$ (SE)
Explicit CURE	0.294* (0.14)	0.276+ (0.14)	0.297+ (0.15)	0.261+ (0.14)	0.247 (0.15)
Number of previous in-school research experiences (pre-course)		-0.258+ (0.14)			-0.316* (0.15)
Experiences of ownership (post-course)			0.012 (0.14)		0.049 (0.16)
Experiences of discovery (post-course)				0.199 (0.14)	0.236 (0.15)
<i>F</i>	4.24	3.96	2.08	3.13	2.85
<i>p</i>	0.045	0.026	0.137	0.054	0.035
<i>N</i>	47	47	47	47	47
Adjusted <i>R</i> <sup>2</sup>	0.07	0.11	0.05	0.09	0.14

Note: Standardized coefficients are reported. +  $p < 0.10$ , \*  $p < 0.05$ .

However, readers are cautioned not to overinterpret these results, given the limitations of this research. Students' self-identification as researchers in open-ended survey items may not necessarily indicate the sort of lasting change in identity that would promote persistence and adaptive behaviors in the face of future obstacles. The study also addressed only two iterations of a single course taught by a single instructor at a single institution, both of which took place during a period of dramatic upheaval (the COVID-19 pandemic). All findings should be interpreted cautiously.

## Conclusions

Although this study primarily seeks to understand how CUREs might be expanded to business courses, these findings also have implications for the implementation of CUREs in STEM and other disciplines. Relational and ideational resources might have complementary yet distinct effects on student identity development across various disciplines, and CURE learning activities could conceivably provide one or both of these types of resources.

The descriptive findings of students' feelings of ownership also suggest avenues for further research. It was found that many students in the explicit CURE expressed fewer experiences or feelings of ownership than those in the implicit CURE. Future research could apply science education research on epistemic distancing to investigate whether and how this practice occurs in entrepreneurship courses, as well as how it may affect students' success in validating new business ideas.

Future research also should explore how explicitness (or lack thereof) might play differential roles in the identity development and course outcomes of students of various racial, ethnic, and gender identities. Undergraduate

research experiences have been shown to help mitigate inequitable outcomes of undergraduate education (Bhattacharyya and Chan 2021), and researchers should explore whether these specific benefits also can be generated by business education CUREs in particular. Future studies could explore this possibility with larger samples that span different courses, contexts, and outcome measures. Going forward, it is hoped that these findings will be useful to researchers and practitioners alike in designing courses and research experiences that promote equitable outcomes.

**Data Availability Statement:** The data are not publicly available. They are available from the corresponding author upon reasonable request.

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**Conflict of Interest Statement:** The authors have no conflict of interest to declare.

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