Virtually Nonexistent: Gender and Racial Representation in Online K-12 Economics Lessons

Abstract

Women and Black, indigenous, and people of color (BIPOC) are underrepresented in economics. Among the factors contributing to the underrepresentation of these groups, past research has demonstrated a lack of diversity in introductory economics textbooks. We extend this research on representation to examples in economics lessons designed for K-12 audiences. We find that female and BIPOC examples are underrepresented. When present they are less likely to be economists, policymakers, or businesspeople. We also explore how author demographics predict diversity of examples. Authors and teams that include women are more likely to use female examples.

Introduction

In every stage of the economics pipeline, female and Black, indigenous, and people of color (BIPOC) students and scholars are underrepresented. As of 2021, women were only 34.7% of undergraduate economics majors, 32.8% of economics Ph.D. recipients, and 15.5% of economics full professors [Chevalier 2021]. In 2020, under-represented minority students were awarded only 17.8% of undergraduate economics degrees, 11.6% of economics PhDs, and only 6.9% of full professors were under-represented minorities [CSMGEP 2021].[1]

There are a wide variety of barriers that exclude female and BIPOC students from economics [Bansak and Starr 2010; Bayer and Rouse 2016; Lundberg and Stearns 2019; Bayer, Hoover, and Washington 2020]. One barrier identified by past research is that female and BIPOC examples are underrepresented in introductory economics textbooks at the college level [Feiner and Morgan 1987; Robson 2001; Stevenson and Zlotnick 2018]. This lack of representation in teaching and learning materials may contribute to female and BIPOC students reporting economics courses are less relevant to their lives and a lower sense of belonging [Bayer, Bhanot, et al. 2020]. Although past research has examined representation in college textbooks, students often first encounter economics at the high school level. As of 2009, 58% of high school graduates had taken an economics course, an increase from previous decades [Walstad and Rebeck 2012]. Even though female students do better in high school courses than male students [Rebeck and Walstad 2015], they are less likely to pursue even an introductory economics course at the college level [Emerson, McGoldrick, and Mumford 2012].

This paper builds on the research on representation at the college level to investigate representation earlier in the pipeline, in K-12. We examine to what extent there is representation of women and BIPOC in K-12 online economics education material and in what roles they are represented. We also investigate how the demographics of authors predict the demographics of the examples used in the materials. We demonstrate that female and BIPOC examples are underrepresented in K-12 materials, with only 24% of examples being female and 16% BIPOC. Female and BIPOC examples are significantly less likely to be economists, business leaders, or policymakers when they are present. Female authors or teams that include female authors predict more female examples, but there are no differences in BIPOC examples by BIPOC authorship.

---

[1] Under-represented minority is defined as Black, Hispanic, or Native American [CSMGEP 2021].

This lack of representation in K-12 materials may be one factor contributing to inequality in the field of economics and, importantly, is relatively easy to change.

Data

The data source we use for K-12 lessons is the National Council for Economic Education's (NCEE) EconEdLink (https://www.econedlink.org/), which provides free economics K-12 lessons and activities online. There were 1.2 million unique visitors per year who accessed lesson plans and resources from EconEdLink [Council for Economic Education 2022]. These types of publicly available, free, online, open educational resources may be particularly relevant in high school economics. High school social studies teachers – the most common credential for teaching economics – have typically taken only 1.5 economics courses [Bosshardt and Walstad 2019] and thus rely on sources like the NCEE for vetted lesson materials.

As of September 2022, there were 539 lessons[2] on EconEdLink. Lessons have a variety of components, including videos, presentations, readings, activities, and worksheets. Our team sampled these lessons using a random number generator to select a page number within EconEdLink, and then a second iteration of the random number generator to select the lesson number from that page – ultimately coding 160 lessons. For each lesson, we gathered race and gender information on the author. The primary source of author information was the EconEdLink author profile, which usually included a biography, with gender-identifying pronouns, along with a photo. If needed (if pronouns or a photo were not available in the biography) we searched online for a biography/photo.[3] As a last resort, we used genderize.io, a website which classifies gender based on name [Santamaría and Mihaljević 2018].[4]

While some authors self-identify their race, others do not and in these cases, we reverted to coding more broad categories of white/white-passing[5] and BIPOC based primarily on their photos (supplemented by names).[6] If there were multiple co-authors of different races and

---

[2] The EconEdLink classroom resources website also includes webinars, articles, activities, calculators, manuals, and videos. We only used the resource type "lesson."

[3] For instance, we searched for Harlan Day at Purdue University, who had no photo nor bio on EconEdLink and found a photo on LinkedIn.

[4] For instance, Marty Yopp was the name of an author with no bio, no photo, and no institution. We therefore used genderize.io to determine that the name Marty was most likely male.

[5] "Passing" is when someone of one racial/ethnic group is perceived as belonging to another.

[6] This approach inserts researcher subjectivity in race coding for authors, which is a limitation of our analyses. Subjectivity is particularly likely to apply for classifying authors as white-passing, where the person may not identify as white but we code them as white because of their photo.

genders we recorded this as a mixed-race or mixed-gender team. In our analyses we examine specifically whether the team included a female member (female author or mixed-gender). Likewise, in our analyses we specifically examine whether the team included a BIPOC member (BIPOC author or mixed team, including BIPOC). We deem the authors' gender and race for lessons credited to a named group[7] as not applicable. However, in the case of lessons that have one lead author listed along with a group, we base the authors' demographics on the lead author.

Within each lesson, we identified whether there was an example with a named individual (e.g. "Janet Yellen" or "John"). There were 91 lessons within our sample with examples, and this is the universe we analyze. For each named example within a lesson, we coded the race, gender, and role of the example.[8] Past research with introductory economics textbooks has highlighted that female examples are less likely to be economists, business leaders, or policymakers, and more likely to be in passive roles [Stevenson and Zlotnick 2018]. We distinguish roles as fictional (made-up examples, such as "Sally Saver"), celebrity (including athletes), economist, policy-maker, business leader, or other (e.g. scientist, medical patient, journalist).

We found 368 examples within the lessons. Examples are our unit of observation in our analyses. We were able to code gender (almost always based on pronouns in the context of the example) and role for all examples. When the role was fictional, we did not code race.[9] However, for real world examples, we were able to code race for 267 examples. Among the examples, we identify the authorship team gender for 295[10] and authorship team race for 259.[11]

---

[7] Named groups were organizations such as the Council for Economic Education.

[8] For instance, the lesson "Multipliers and the Mystery of the Magic Money" had two example bank customers, one named Tamika and one named Mariluz. Tamika and Mariluz were fictional examples ("for example if Tamika" is how she is introduced) and both are referred to with "she" pronouns in the story. Because they are fictional, we did not assign race. The author was Lisa Herman-Ellison, and in her biography on EconEdLink, there were "she" pronouns. Her photo was on the EconEdLink website and based on her appearance, the research assistant categorized her as white or white passing.

[9] While coding the race of fictional characters could add an interesting dimension to the analyses, we do not think there is an accurate way to code how race and ethnicity were intended or perceived. Coding race for authors and real people had context (e.g., photos), for fictional characters we decided there would be too much (perhaps entirely) subjective bias driving coding.

[10] There were 89 female authors, 115 male authors, and 91 mixed-gender teams. There were 73 N/A (organizational) authors.

[11] Among authors we could identify, there were 4 BIPOC authors, 50 mixed-race teams, and 205 white authors.

Hypotheses and Methods

We have three fundamental research questions, focusing on K-12 online economics education materials: (1) To what extent are there female and BIPOC examples in K-12 economics education materials available online? (2) In what roles are female and BIPOC examples represented? and (3) How do author demographics predict who is represented in examples? We test a series of hypotheses corresponding to these research questions. The specific null hypotheses we test are:

H1: The proportion of female examples is equal to women's share in the U.S. population.

H2: The proportion of BIPOC examples is equal to the BIPOC share in the U.S. population.

H3: The share of female examples represented as economists, business leaders, or policymakers is equal to that of male examples.

H4: The share of BIPOC examples represented as economists, business leaders, or policymakers is equal to that of white examples.

H5: Female and male authors are equally likely to use female examples.

H6: BIPOC and white authors are equally likely to use BIPOC examples.

Population shares of women and BIPOC individuals are from the U.S. Census Bureau [United States Census Bureau 2022]. We test H1 and H2 as a one-sample z-test for the proportion. We test H3 and H4 with a two-sample z-test of proportions. We test H5 and H6 with linear probability models (using ordinary least squares, OLS) as follows:

$ExampleFemale_i = \beta_0 + \beta_1 AuthorFemale_i + \varepsilon_i$

$ExampleBIPOC_i = \beta_0 + \beta_1 AuthorBIPOC_i + \varepsilon_i$

Results

Female and BIPOC examples

In Figure 1, we show the percentage of examples that are BIPOC as well as the percentage that are female, along with the distribution of authorship by race and gender. Only 24% of examples are female (compared to 76% male) and only 16% are BIPOC (compared to 84% white). While 61% of authors are female or mixed-gender, only 21% are BIPOC or include a BIPOC member.

**Figure 1. Race and gender of examples and authors (percentages)**
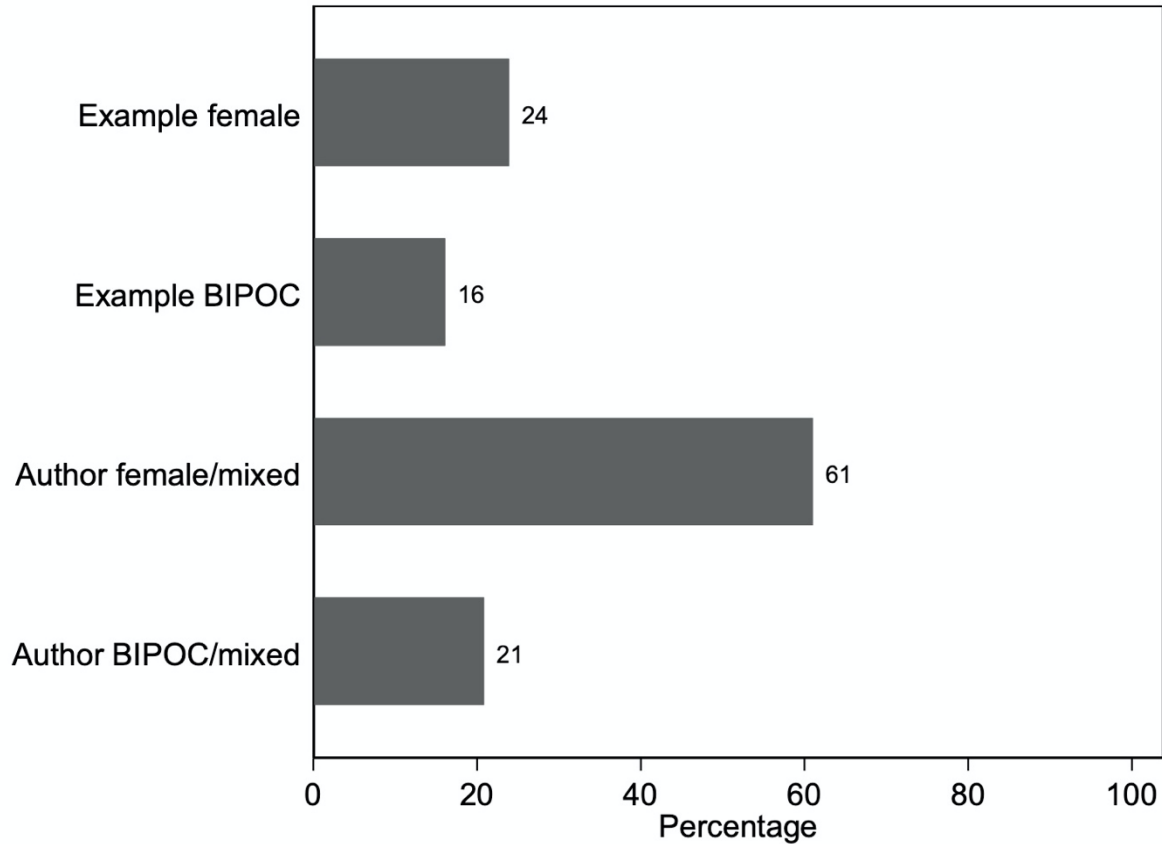
Source: Authors' calculations based on sample of EconEdLink data

To test H1, that the proportion of female examples is equal to women's share in the population, we estimated the probability of observing our sample proportion of female examples (0.239) relative to 0.505, the female share of the U.S. population [United States Census Bureau 2022]. We reject the hypothesis ($p<0.001$) that female examples are population-representative; female examples are underrepresented in K-12 online education materials. To test H2, that the proportion of BIPOC examples is equal to the BIPOC share in the population, we estimated the probability of observing our sample proportion of BIPOC examples (0.161) relative to 0.407, the BIPOC proportion in the U.S. population [United States Census Bureau 2022]. We reject the hypothesis ($p<0.001$) that BIPOC examples are population-representative; BIPOC examples are underrepresented in K-12 online education materials.

Gender, race, and roles

Past research has established that female examples in introductory economics textbooks are less likely to be economists, policymakers, or business leaders, and more likely to be fictional or celebrities [Stevenson and Zlotnick 2018]. Economics textbooks likewise race code poverty [Clawson 2002]. We investigate roles by gender and race in Figure 2. While 59% of male examples are economists, policymakers, or business leaders, only 20% of female examples are in these roles. We test the hypothesis (H3) that female and male examples have an equal probability of being economists, policymakers, or business leaders. We reject this hypothesis (p<0.001); female examples are significantly less likely to be economists, policymakers, or business leaders than male examples. Female examples are primarily fictional (52%) or in other roles (25%, e.g. medical patient, journalist).

Figure 2. Roles of examples (percentage), by example race and gender
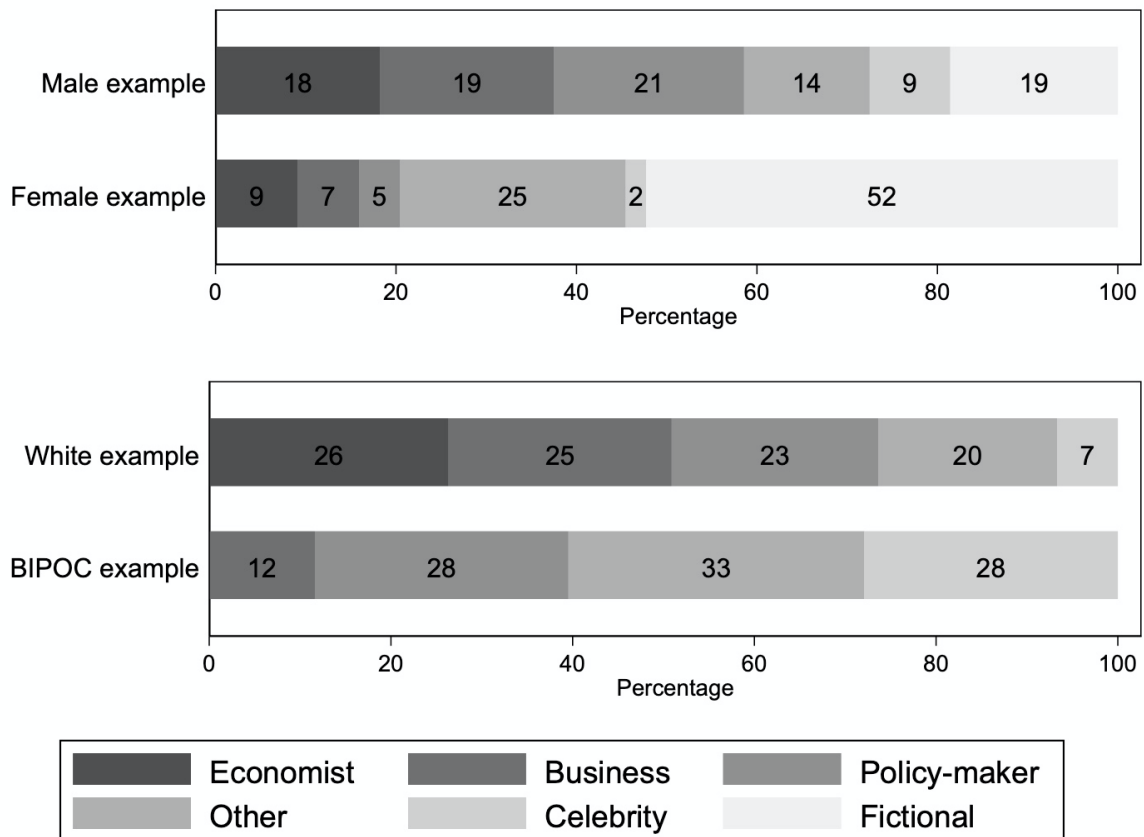
Source: Authors' calculations based on sample of EconEdLink data
Note: Fictional examples are excluded from figures on race

BIPOC examples are also in different roles than white examples (Figure 2). Note that we exclude fictional examples from our analyses by race. While 74% of white examples are economists, policymakers, or business leaders, only 40% of BIPOC examples are in these roles. When we test H4, that BIPOC and white examples have an equal probability of being economists, policymakers, or business leaders, we reject the hypothesis ($p<0.001$); BIPOC examples are significantly less likely to be in these roles than white examples. There are in fact zero examples of BIPOC economists, only 12% are business leaders, and 28% policymakers. BIPOC examples are particularly likely to be celebrities (28%).

Authorship and examples

Are diverse authors more likely to use diverse examples? To test H5, we regress whether an example is female on whether the author or authorship team is female. We present the results in Table 1 (example female column). Having a female author (or mixed-gender team) predicts a statistically significant ($p=0.016$) higher chance of a female example, by 12.1 percentage points. The reference, male probability is only 15.7%, so a female author nearly doubles the probability. We note, however, that in neither case is there gender parity in examples. For H6, in Table 1 (example BIPOC column), we investigate whether a BIPOC author or (much more frequently) a BIPOC author in the team predicts a higher probability of using BIPOC examples. We find no significant difference and the coefficient is in fact a small negative.

Table 1. Linear probability models of example demographics by author demographics

	Example female	Example BIPOC
Author gender (male omit.)		
Author female/mixed	0.121*	
	(0.050)	
Author race (white omit.)		
Author BIPOC/mixed		-0.041
		(0.066)
Constant	0.157***	0.169***
	(0.039)	(0.030)
N obs.	295	187
R-sq.	.0197	.00203

Source: Authors' calculations based on sample of EconEdLink data
Note: *$p<0.05$; **$p<0.01$; ***$p<0.001$. Fictional examples are excluded from figures on race.

Discussion and Conclusions

Female and BIPOC examples are significantly and substantially underrepresented in K-12 lessons. The female and BIPOC examples that do exist are significantly less likely to be economists, policymakers, or business leaders. Together these facts compound, such that female and BIPOC students see very few examples of individuals who share their identity engaging in economics, business, or policy. Although there are a multitude of causes contributing to the underrepresentation of female and BIPOC students in economics [Bansak and Starr 2010; Emerson, McGoldrick, and Mumford 2012; Bayer and Rouse 2016; Buckles 2019; Lundberg and Stearns 2019; Bayer, Hoover, and Washington 2020], the inability to see themselves in teaching and learning materials may be one contributing factor [Bayer, Bhanot, et al. 2020; Al-Bahrani 2022].

There are a number of important limitations of this research to keep in mind. While the coding of examples and authors was clear in most cases, in other cases, particularly for author race, subjective judgments had to be made by the research assistant coding the example. Race may thus have more measurement error and subjectivity than gender. The data in this study are from only one source of online, U.S., K-12 lessons. Although EconEdLink is a popular website

and links to a variety of resources, results may be different with other sources, or in other country contexts.

We explored only race and gender aspects of representation, and further research is needed on other aspects of identity and their representation in lessons. It also could be interesting to explore whether the "other" occupations are stereotyped by race and gender. For instance, are nurses or scientists stereotyped? We only had 61 observations in the other category, e.g., one scientist, one doctor, and one lawyer, so were unable to undertake disaggregated analysis of other professions. Further research could also explore more about what different roles are doing and what language describes them (e.g. active or passive), potentially using a machine-learning and natural language processing approach for the text surrounding examples.

An important question, which we did not answer in our research, is whether these online K-12 materials are more or less biased than other sources of material, such as K-12 textbooks. We can compare our online K-12 materials to the most recent statistics on introductory economics textbooks at the college level. Excluding gender neutral examples (6%), 19% of examples in college textbooks were female, similar but slightly lower than our 24% share [Stevenson and Zlotnick 2018]. While in our data only 14% of economist examples were female, along with 10% of business leaders and 6% of policymaker examples, in introductory college economics textbooks, these shares were 6-8% [Stevenson and Zlotnick 2018]. Whether online college materials or K-12 textbooks are more or less representative is an important question for future research, with implications for teachers and faculty selecting materials and modalities.

The underrepresentation of female and BIPOC examples, particularly as role models, in economics materials requires at least two clear actions (1) lesson authors can work to diversify their examples and (2) teachers at the K-12 level and faculty at the college level can carefully review their teaching and learning materials to address representation. Assessments of representation in syllabi and reading lists can be facilitated by automated tools, such as the Gender Balance Assessment Tool [Sumner 2018; Schucan Bird and Pitman 2020]. There are a number of resources available at the college level to pursue diverse materials [Bayer, Bruich, et al. 2020; Bayer 2021]. Efforts are needed to identify such materials at the K-12 level to facilitate their use by educators.

Future research should empirically investigate how using more representative teaching and learning materials affects persistence in economics, particularly at the K-12 level. Past

research suggests exposing introductory economics students to charismatic female role models nearly doubles women's persistence in economics [Porter and Serra 2020]. Pedagogical approaches to economics focused on social issues may also attract more diverse students, as women were more likely to take an introductory economics course on these topics than a traditional principles course [Bayer, Bruich, et al. 2020]. Students generally have inaccurate perceptions of the potential applications of economics and careers in economics [Bansak and Starr 2010], and revising economics curricula to showcase topics such as discrimination may be an important additional avenue to complement improving representation in examples. Efforts to improve representation in teaching and learning materials can be an important part of efforts to increase representation of BIPOC and female students in economics courses and ultimately the economics profession [Stevenson and Zlotnick 2018; Bayer, Bhanot, et al. 2020; Bayer, Hoover, and Washington 2020].

References

Al-Bahrani, Abdullah. 2022. Classroom Management and Student Interaction Interventions: Fostering Diversity, Inclusion, and Belonging in the Undergraduate Economics Classroom. Journal of Economic Education 53 (3): 259–272.

Bansak, Cynthia, and Martha Starr. 2010. Gender Differences in Predispositions towards Economics. Eastern Economic Journal 36 (1): 33–57.

Bayer, Amanda. 2021. Diversifying Economic Quality. American Economic Association Committee on the Status of Minority Groups in the Economics Profession (CSMGEP). Retrieved July 24, 2022. https://diversifyingecon.org/about/.

Bayer, Amanda, Syon P. Bhanot, Erin T. Bronchetti, and Stephen A. O'Connell. 2020. Diagnosing the Learning Environment for Diverse Students in Introductory Economics: An Analysis of Relevance, Belonging, and Growth Mindsets. AEA Papers and Proceedings 110: 294–298.

Bayer, Amanda, Gregory Bruich, Raj Chetty, and Andrew Housiaux. 2020. Expanding and Diversifying the Pool of Undergraduates Who Study Economics: Insights from a New Introductory Course at Harvard. NBER Working Paper Series No. 26961. Cambridge, MA.

Bayer, Amanda, Gary A. Hoover, and Ebonya Washington. 2020. How You Can Work to Increase the Presence and Improve the Experience of Black, Latinx, and Native American People in the Economics Profession. Journal of Economic Perspectives 34 (3): 193–219.

Bayer, Amanda, and Cecilia Elena Rouse. 2016. Diversity in the Economics Profession: A New Attack on an Old Problem. Journal of Economic Perspectives 30 (4): 221–242.

Bosshardt, William B., and William Walstad. 2019. The Undergraduate Economics Coursework of Elementary and Secondary School Teachers. Journal of Economic Education 50 (4): 410–417.

Buckles, Kasey. 2019. Fixing the Leaky Pipeline: Strategies for Making Economics Work for Women at Every Stage. Journal of Economic Perspectives 33 (1): 43–60.

Chevalier, Judy. 2021. The 2021 Report of the Committee on the Status of Women in the Economics Profession. American Economic Association.

Clawson, Rosalee A. 2002. Poor People, Black Faces: The Portrayal of Poverty in Economics Textbooks. Journal of Black Studies 32 (3): 352–361.

Council for Economic Education. 2022. Metrics: Explore the Difference That CEE Is Making Across the Country. Retrieved July 24, 2022.
https://www.councilforeconed.org/about/impact/metrics/.

CSMGEP. 2021. Report of the Committee on the Status of Minority Groups in the Economics Profession (CSMGEP). American Economic Association.

Emerson, Tisha L.N., Kimmarie McGoldrick, and Kevin J. Mumford. 2012. Women and the Choice to Study Economics. Journal of Economic Education 43 (4): 349–362.

Feiner, Susan F., and Barbara A. Morgan. 1987. Women and Minorities in Introductory Economics Textbooks: 1974 to 1984. Journal of Economic Education 18 (4): 376–392.

Lundberg, Shelly, and Jenna Stearns. 2019. Women in Economics: Stalled Progress. Journal of Economic Perspectives 33 (1): 3–22.

Porter, Catherine, and Danila Serra. 2020. Gender Differences in the Choice of Major: The Importance of Female Role Models. American Economic Journal: Applied Economics 12 (3): 226–254.

Rebeck, Ken, and William B. Walstad. 2015. Grades, Coursework, and Student Characteristics in High School Economics. Journal of Economic Education 46 (2): 219–230.

Robson, Denise. 2001. Women and Minorities in Economics Textbooks: Are They Being

Adequately Represented?. The Journal of Economic Education 32 (2): 186–191.

Santamaría, Lucía, and Helena Mihaljević. 2018. Comparison and Benchmark of Name-to-Gender Inference Services. PeerJ Computer Science 4 (e156): 1–29.

Schucan Bird, K., and Lesley Pitman. 2020. How Diverse Is Your Reading List? Exploring Issues of Representation and Decolonisation in the UK. Higher Education 79 (5): 903–920.

Stevenson, Betsey, and Hanna Zlotnick. 2018. Representations of Men and Women in Introductory Economics Textbooks. AEA Papers and Proceedings 108: 180–185.

Sumner, Jane Lawrence. 2018. The Gender Balance Assessment Tool (GBAT): A Web-Based Tool for Estimating Gender Balance in Syllabi and Bibliographies. PS - Political Science and Politics 51 (2): 396–400.

United States Census Bureau. 2022. QuickFacts: United States. Retrieved July 24, 2022. https://www.census.gov/quickfacts/fact/table/US/LFE046220.

Walstad, William B., and Ken Rebeck. 2012. Economics Course Enrollments in U.S. High Schools. Journal of Economic Education 43 (3): 339–347.