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Teaching and Educational Methods

Responsible Conduct of Research for Graduate Students: What Should They Know?

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Abstract

This paper provides exploratory evidence on research misconduct in social sciences with an emphasis on applied economics. We review peer-reviewed published work to discuss how these trends of research misconduct compromise the trust, honesty, reliability, and credibility of scientific work. In addition, we offer suggestions to incorporate content on the responsible conduct of research in graduate education in social sciences. This paper should be of interest to graduate programs and academics interested in graduate education in applied economics, and likely benefit graduate students in social sciences as they build their research profiles and establish a reputation in the field.

Introduction

"If I have seen further, it is by standing on the shoulders of giants." –Sir Isaac Newton, 1675

This statement aptly applies to graduate students in social sciences who are passionate about building research programs and establishing a reputation in professions based on trust and integrity. Graduate education is a time of creativity and opportunities, as well as growth of professional values and integrity. Graduate students are faced with both the privilege to undertake research and develop an intellectual and moral responsibility for their research conduct (i.e., research ethics).

Even though yet to be integrated into curricula, borrowing from biomedical sciences, most agricultural and applied economics graduate programs in the U.S. universities require university-wide responsible conduct of research (RCR) training as a prerequisite part of graduate education. This is meant to impart baseline knowledge about the core concepts, standards, and procedures for responsible conduct of research (Heitman et al. 2007). Many universities offer services about responsible conduct of research to graduate students across all disciplines and are intended "to promote safe, responsible, and productive research practices." One such example is Texas Tech University's (TTU) responsible conduct of research resources offered through the TTU's Office of Research and Innovation.¹ These resources include (i) RCR Training, (ii) TTU National Science Foundation (NSF) Ethics Plan, and (iii) iThenticate services meant to aid research conduct for the TTU community. However, how much of this information is internalized by graduate students is unknown. Uncorroborated evidence would suggest that most graduate students pay little attention to these "required" training modules.

Research misconduct creates a credibility problem that can affect a graduate student's career. There are a few courses primarily devoted to research ethics education. This is despite a plea decades ago for the profession to devise ways of teaching graduate students the importance of maintaining the highest levels of honesty and integrity (Litzenberg, Gorman, and Schneider 1983), which has been re-affirmed more recently (Gillespie and Bampasidou 2018).

The public accepts or rejects research based on reliability and trust of scientific results that impact public health, the environment, the economy, and society in general (Anderson 2016). To many graduate

¹ <https://www.depts.ttu.edu/research/integrity/RCR/index.php>.

students, the research writing and publication process is a mystery (Shepherd and Arrow 1995). In a curious graduate student's mind, innocent blunders are a possibility.² The primacy of publications as a key transmitter of scientific knowledge and a signal in promotional decisions in the applied economics profession puts research ethics at a premium.³ However, for many graduate students, research misconduct and publication blunders can prove to be disastrous for their future careers. Given the increasing importance of scientific research in academia and society, this paper seeks to discuss some developments in research conduct that threaten the credibility of work conducted in agricultural and applied economics. Specifically, the study follows how research misconduct raises ethical issues in the design, collection, management, and analysis of data, as well as the transformation of ideas into publications in the field by extending the analysis in Josephson and Michler (2018). Josephson and Michler (2018) discuss ethical issues in agricultural and applied economics and suggest possible ways in which the profession can address these issues. The main objective of this commentary is to clarify what is research misconduct and how graduate students can avoid it with resources available on campus and in the public domain as they build their research profiles. This is the gap that the current study seeks to address.

The rest of the paper is organized as follows. Section 2 presents an (unproven) theory of research misconduct. Section 3 describes the responsible conduct of research in the United States. In Section 4, research misconduct is defined, and Section 5 describes training resources available on campus and in the public domain for graduate students. Sections 6 and 7 give recommendations and conclude the paper.

2 An (Unproven) Explanation of Research Misconduct

It is hard to precisely explain the reasons behind the emergence and persistent rise in counts of misconduct. An (unproven) explanation to potentially account for these trends builds on the theory that research misconduct generally comes from scholars who place a disproportionate weight on status and gains.⁴ It usually happens when one values the result more than the research process, the prize money more than the game. When this happens, one is tempted to look the other way when facing ethical dilemmas, thus leading to misconduct in one's work.

This unfortunate reality usually follows the culture and practice presently dominant in the academic profession. Academicians are evaluated based on their research, appearing in top journals, for jobs, promotion, and tenure (Griffiths and Winters 2005; Heckman and Moktan 2020). It is how high and big you score that carries significant weight in an academic economist's career prospects. At present, one is not directly evaluated on academic integrity, though this is debatable as other scholars are of the view that not having this evaluation criterion can have significant consequences if caught.⁵ Academics are traditionally evaluated on research, teaching, and service with the quantity and quality of research carrying significant weight in job offers and promotion decisions. The field of agricultural and applied economics has not yet established a market and price for one's efforts to diligently catch flaws in one's work (Dorfman et al. 2024).⁶

3 Responsible Conduct of Research in the United States

Research writing and publication are an integral part of the U.S. academic system. At best, the system identifies the best ideas, improves them, and spreads them, and at worst, it suppresses original, new, and creative thoughts by maintaining erring orthodoxy (Shepherd and Arrow 1995). In either case, the system

² This forms the sour education in the school of hard knocks (Hamermesh 1992).

³ In this paper, the words agricultural and applied economics and applied economics are used interchangeably.

⁴ This intuition is attributed to a tweet by Ariel Ortiz-Bobea dated June 18, 2023, which can be accessed at the following link <https://x.com/arielortizbobea/status/1670436298979708928?s=46>.

⁵ However, there are limits to this view. At many land-grant institutions, and others, teaching and Extension are very important components of promotion and tenure evaluations. There may at times be a greater weight on research, depending on the institution. We thank an anonymous reviewer for these points.

⁶ This is the general case in other fields.

generates a marketplace for ideas. With or without market failures existing, it shapes the path of economic thought and eventually determines careers for economists. In the United States, there are generally accepted norms that shape research conduct. Many universities offering graduate training in the United States have a designated office that specifically handles issues related to RCR.⁷ Some of the respect for U.S. scientific research across all fields can be credited to the norms and views of this process (Shepherd and Arrow 1995). This is to be expected given how seriously the United States regards research efforts as signaled by a significant number of resources allocated toward research and development (R&D). For example, in 2008, total private and public expenditure on R&D constituted at least 2.5 percent of the gross domestic product (GDP) in the United States (Shamoo and Resnik 2009) with economic activity directly linked to scientific research estimated at 6 percent of U.S. GDP (Resnik 2007).

In 1974, the U.S. Congress established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. This followed findings about the Tuskegee Syphilis Study that details a U.S. Public Health Service survey in which unethical research practices were conducted in a long-term study of untreated syphilis using a sample of approximately 400 African-American black men (Josephson and Michler 2018). Misconduct manifested in that the researchers intentionally withheld effective treatment from these men consequently leading to the death of some of them.

Following the Tuskegee Syphilis Study, the Belmont Report was issued in 1979 by the commission to try and define key principles to guide the ethical conduct of research in the United States. The key objective of the report was to address the mistreatment of human subjects in the research process. The report lays out guidelines and ethical principles, including (i) respect, (ii) beneficence, and (iii) respect for persons (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1979; Josephson and Michler 2018).

Although social sciences were not the focus of the Belmont Report, our profession (economics in general and agricultural and applied economics in particular) has adopted several of the report's guidelines as evidenced by the growing presence of Institutional Review Boards (IRBs) and Research Ethics Boards (REBs) at universities in a bid to foster application and upholding of ethical principles outlined in the Belmont Report.⁸ It is common in the United States and Western universities to require researchers to obtain prior approval for studying human subjects and instrument design before fieldwork is carried out. Informal guidelines and specific requirements [commonly for Department of Health and Human Services (HHS) and IRB applications] exist to aid economists in designing research projects to meet stipulated standards by review boards (Barrett, Cason, and Lentz 2020).

Klitzman (2015) examines variations between IRBs and argues that IRBs differ in colors and flavors, and vary from nit-picky to user-friendly. As such, this variation is expected across fields and disciplines, impacting and reflecting differences in values regarding research ethics.

4 Research Misconduct Defined

What is research misconduct? Before we attempt to answer this question, we first define the constituent parts of this question—"research" and "misconduct." The *Webster's Collegiate Dictionary* (1977, p. 1,758) gives a general definition of research as the "studious inquiry or examinations, especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of such new or revised theories or laws."⁹

⁷ Offices of responsible research collaborate with the academic community in a bid to promote safe, responsible, and productive research practices and promote dialogue about the ethical concerns arising naturally from endeavors to do creative science.

⁸ This is also required by many funding agencies, especially for federal grants if conducting human subjects research to even get funds. There are specific guidelines laid out by the Department of HHS and referenced by NIH that one may check (<https://www.hhs.gov/ohrp/index.html>). In addition, one can also look at FERPA requirements.

⁹ Building on this definition, other scholars such as Andrew and Hildebrand (1982) and Ghebremedhin and Tweeten (1988) define research on terms of a scientific inquiry into what is not known.

In the early 2000s, the United States adopted and effected a generic definition of research misconduct for federally funded research projects as fabrication, falsification, or plagiarism, denoted as FFP (Resnik et al. 2015). The *Compact Edition of the Oxford English Dictionary* defines plagiarism as “the action or practice of plagiarizing; the wrongful appropriation or purloining, and publication as one’s own, of the ideas, or the expression of ideas (literary, artistic, musical, mechanical, etc.) of another” (Murray 1971, p. 2,192). Artificial Intelligence (AI) has become instrumental in aiding and detecting plagiarism (Francke and Bennett 2019).

Using categories outlined in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1979), we define research misconduct as including but not limited to the fabrication or falsification of data and all forms of plagiarism committed intentionally or unintentionally. A key condition for misconduct to be established is that the allegation must be proven by sufficient and strong evidence. Building on previous efforts from biomedical research, we review studies examining deceit, dishonesty, and research misconduct in the collection, management, and analysis of data and communication of results (through publication).

4.1 Research Misconduct in Social Sciences

There is growing evidence in the social sciences as indicated by the increase in the frequency of retracted papers in psychology, business and management, and economics. In psychology alone, of the estimated 250 retracted papers, 12 percent of them report incorrect *p* values to validate researchers’ preconceived notions (Craig et al. 2020).

Table 1 shows some evidence of paper retraction reasons reported by Cox, Craig, and Tourish (2018); Tourish and Craig (2018); and Craig et al. (2020).

Craig et al. (2020) examined 160 retracted articles to show some evidence of research misconduct in psychology compared to economics and business and management. Many retracted papers in psychology are due to data fabrication (48 percent) compared to 0 percent in economics and 33 percent in business and management. A sizeable number of retractions in economics result from fake peer reviews.

The rate of retractions as a percentage of total retractions owing to all forms of plagiarism is significantly lower in psychology (13 percent), compared to economics (22 percent), and business and management (25 percent). This is consistent with findings by Horbach and Halfman (2019). Although fake peer review is common in economics, psychology, and business and management, other reasons cited for paper retractions include (i) publishing without consent from all named authors; (ii) making substantial changes to a paper after its acceptance; (iii) violating ethical, privacy, or intellectual property

Table 1. Reasons for Paper Retractions in Economics, Business and Management, and Psychology, 1998 to 2017.

Reason	Economics		Business & Management		Psychology	
	No.	%	No.	%	No.	%
Data manipulation	0	0	51	33	77	48
Self-plagiarism	6	11	23	15	8	5
Plagiarism	6	11	16	10	12	8
Statistical errors	2	4	18	12	36	22
Fake peer review	12	22	0	0	0	0
Other ¹⁰	0	0	33	22	19	12
No reason	28	52	12	8	8	5

Notes: The table is adopted and modified from Cox et al. (2018), Tourish and Craig (2018), and Craig et al. (2020). The percentage points in Table 1 represent percentage of total retractions and not percentage of published articles.

¹⁰ Other refers to uncategorized reasons for retraction.

protocols; and (iv) making administrative errors. In an attempt to discuss ethical issues facing the profession and some possible ways of addressing them, Josephson and Michler (2018, p. 5) argue that while “MSc and Ph.D. econometrics courses may include a conversation about data manipulation, most graduate students and present-day professionals do not receive formal training in ethical treatment or cleaning of data sets. This contrasts to the hard sciences, where research ethics courses are frequently a prerequisite to lab or field work.”

5 Responsible Conduct of Research Training for Graduate Students

Training of technical skills for graduate students in social sciences is fairly rigorous. It is generally believed however that the skills required to perform research are neither well taught nor rewarded by institutions. Deeper training on research integrity in scholarly work is a skill in short supply.¹¹ This is even lacking more among graduate researchers.¹²

Training graduate students on matters concerning responsible conduct of research is key in helping them conduct effective research. Graduate schools exist to impart advanced technical skills to students to become effective at conducting relevant and original independent scientific work (Hartnett and Katz 1977).¹³ To accomplish this goal, graduate students need to include in their toolkit both technical skills and sound ethical research awareness.¹⁴

An online review of 10 top schools in agricultural economics in the United States suggests that graduate training in responsible conduct of research is not a common practice.¹⁵ None of the surveyed schools prescribe a formal course in responsible conduct of research in their graduate programs in agricultural economics. This does not suggest that topics relevant to responsible research conduct are not addressed in other courses. It is conceivable that a course in research methodology includes topics of responsible research conduct. Six of the top 10 schools surveyed appear to offer at least one graduate-level class (with varying credit hours) in research methodology. Table 2 summarizes our survey results related to course offerings research methodology at these schools.

Table 2. Survey Results of Course Offerings in Research Methodology in Top 10 Schools in Agricultural Economics in the United States.	
University	Course in Research Methodology
Cornell University	None
Texas A&M University	Yes, AGECE 607 – Research Methodology, 3 credits
Univ. of Illinois	Yes, ACE 561 – Adv Res and Scholarly Comm, Seminar
Purdue University	None
University of Georgia	Yes, AAEC 8300 – Agricultural Economics Research, 2 credits
University of Florida	None
University of Wisconsin	Yes, AAE 721 – Professional Communication of Applied Economic Analysis, 1 hour; AAE 780 – Research Colloquium, 3 credits
University of Nebraska	Yes, AECN 821 – Orientation to Research, 1 credit
Ohio State University	None
North Dakota State University	Yes, AGECE 701 – Research Philosophy, 1 credit

¹¹ This point came about in an informal discussion with Jerry Parwada in 2019.

¹² Many programs cover academic dishonesty and plagiarism. In addition, students get exposed to human subjects research training if conducting it, as it is mandatory. What may often be less publicized is the impacts of violating research ethics.

¹³ Ruttan and Weisblat (1965) complain that “American graduate training in agricultural economics tends to be technique-rather than problem-oriented.”

¹⁴ The Department of Agricultural and Applied Economics at Texas Tech University has a special training for its graduate students. In addition to rigorous technical training, the department offers special training in research methodology in economics. This complements the research ethics training offered by the university.

¹⁵ <https://www.collegefactual.com/majors/agriculture-ag-operations/agricultural-economics-business/agricultural-economics/rankings/top-ranked/>.

Building on this present practice, there is an opportunity to design and teach a course or module specifically on RCR to graduate students in social sciences purposefully and intentionally. Resnik and Dinse (2012) explore the degree to which United States-based research institutions meet or even exceed mandates stipulated by the National Institutes of Health (NIH) and National Science Foundation (NSF) in terms of guidance and instruction in responsible conduct of research. Responses received from 144 institutions, representing 72 percent of the sample, indicate that they have a formal responsible conduct of research program aimed at promoting research integrity while 47.9 percent of the institutions report that only federally mandated persons take RCR training. There is a possibility to increase the fusing of ethics in graduate-level curriculums in social sciences to foster integrity in RCR.

Most business school disciplines, compared to applied economics, advocate for the introduction of ethics into graduate program curricula. To explore this, Nicholls et al. (2013) review the infusion of ethics, corporate social responsibility (CSR), and sustainability in teaching approaches and evaluation by business schools accredited by the Association to Advance Collegiate Schools of Business International (AACSB or AACSB International). This paper is the first to take a marketing view of ethics. In the marketing of undergraduate and graduate programs, the deans and heads of departments are observed to react to signals sent to them from their accrediting bodies. The authors uncover a very important snapshot of the status quo of ethics integration, CSR, and sustainability in marketing curricula at the undergraduate and graduate level.

One may ask, why should social sciences graduate programs offer training on responsible conduct of research and ethics as a part of the curriculum? Education on ethics of research can increase graduate students' awareness of their intellectual responsibility. An integral part of the responsible conduct of research is disseminating research findings—writing, publishing, and professionally presenting research. Bellemare (2020) argues that although many graduate students and research economists, by instinct, know how to do so, many of them hardly think about how to write good research papers. Even the most seasoned and successful struggle to come up with a clear answer to this question.

Thomson's (2001) book is an invaluable reference source for graduate students preparing their dissertations and initial papers for submission to professional journals. It is also a guide for one to prepare to give their first professional talk at academic conferences or take their first refereeing assignment professionally and ethically. The central theme of the book is an attempt to make both the writing and oral presentations inviting and efficient by giving general principles to help guide graduate students. Earlier on, Ethridge (2004) provides a reference guide to instruct graduate students on the research and writing process by integrating philosophy, concepts, and procedures in research methodology. By doing this, the author sheds light on the organization and conducting of research, which can help graduate students increase the efficiency of the research process and its outcomes. However, less is talked about in this book as far as RCR is concerned. The author focuses heavily on research methodology and not on RCR.

McCloskey (2019) offers 35 tips to write clearly and persuasively, and maintains that "writing better will pay." Writing is likened to mathematics. Mathematics is a language, an instrument of communication. In the twelfth chapter of the book, the author challenges graduate students and early career researchers to imitate the best by being students of the masters and making the wisdom of the wise theirs. To the consolation of graduate students, the author argues that reading and writing are learnable crafts and not inherited genius. Bellemare (2020) recommends a structure along with unspoken rules and norms that guide the writing of applied economics papers. The author demystifies the paper writing process, and the paper is a relevant guide for graduate students. Bellemare (2022) presents unwritten rules of the economics profession by faithfully discussing what economists should have learned in graduate school but did not.

6 Recommendations

We have discussed what research misconduct is and is not in social sciences in general (and agricultural economics in particular) and identified resources available to graduate students both on campus and in the public domain. We recommend more training on the ethics of research conduct to graduate students, specifically as an integral part of an organized class or topic. Integrity in the research and publication process is an important part of the academic system. Graduate programs can commit to upholding norms that shape research conduct by offering a Responsible Conduct of Research course or significant module to graduate students. RCR is currently being offered in some optional form in some of the graduate programs and in agricultural economics graduate programs. The intention is there and is good, but purposeful implementation is still missing. Graduate students need to understand what research misconduct is and is not. There is a need to purposefully and intentionally bring the topic to graduate students.

The proposed course or module should be required of all graduate students and be offered each academic term, as well as reviewed regularly. It would introduce best practices to graduate students to deepen their knowledge of responsible conduct and ethics. As argued by Oscar S. Sarasty, Elisha K. Denkyirah, and Mohammad Rezoanul Hoque, it is good to have an RCR course for graduate students to help them to be transparent with data and properly give credit where it is due in this age of AI and paraphrasing.¹⁶ The objectives of the course could be to cultivate and foster a culture of honesty and integrity among graduate students in social sciences.

In Appendix A, we propose a possible course structure and outline for a course or a module on RCR for graduate students. This course or module should introduce graduate students to the best practices and deepen their understanding of responsible conduct of research and ethics education in applied economics research. The general objective of the course is to cultivate and foster a culture of honesty and integrity among graduate students in social sciences.

7 Conclusion

We review literature and define responsible conduct of research. Because research misconduct is present in biomedical research, economics in general, social sciences, and agricultural and applied economics, there is an urgent need to purposefully train graduate students on RCR and the ethics of conducting research. We focus on both theoretical and empirical work to answer the questions “What is research misconduct?” and “How can graduate students in social sciences avoid this?”

We present resources available to graduate students on campus and in the public domain to guide responsible conduct of research. These include resources on responsible conduct of research training, ethics education, and plagiarism in the form of RCR training and orientations, NSF Ethics Plan, iThenticate service, and RCR online courses. These resources are available on campus through research offices and graduate schools and in the public domain through abstract and cross-reference databases.

By taking advantage of the resources presented in this paper, graduate students can see further and circumvent some of the avoidable pitfalls. As Randy Skeete would put it, “*Self-honesty is man’s Gethsemane*.”¹⁷ The moral, ethical, and professional consequences of research misconduct are far and wide, with few social sciences teaching the principles of research conduct in their curriculum.

In academic disciplines, the integrity and reputation of researchers are important because of the perception it creates. The public accepts or rejects research based on reliability and trust of scientific results that impact public health, the environment, the economy, and society in general (Anderson 2016). Despite the increased proliferation of RCR training programs, it is not yet clear how RCR programs have impacted the trust and integrity of both researchers and the scientific work they do as perceived by the

¹⁶ This was communicated verbally in an in-person seminar.

¹⁷ [Randy Skeete on X: “Self-honesty is man’s Gethsemane!”/X](#)

public. We leave this for future research. Another equally important dimension of this topic is the ethical costs of research misconduct in the non-academic research environment and the role of graduate education. We leave this for future deliberation as well.

What is the implication of our study? We recommend that graduate programs in social science introduce more training on the ethics of research conduct, in conjunction with training on research methodology. One way of achieving that is to offer a graduate course on responsible conduct of research with possible content suggested in this paper. This program needs to be introduced in the first year of graduate education before undertaking research work with continuing education through the graduate student's academic career.

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Appendix A: Proposed Course Structure and Outline

Course: "Course Title"

Course Description:

This course introduces graduate students to best practices in conducting research and deepens their understanding of responsible conduct of research and ethics education in applied economics research. The primary objective of this course is to introduce research methodology and clarify what research misconduct is and is not and how graduate students can avoid it.

Responsible Conduct of Research Statement

Responsible conduct of research is taking responsibility and being honest in one's research work and ensuring ethical behavior in data collection, management, and analysis. Responsible conduct in research is a personal choice reflecting on personal values to do what is right and intellectually honest. Integrity, honesty, and responsible conduct are integral to establishing credibility in agricultural economics research.

Course Objectives:

The general objective of the course is to cultivate and foster a culture of honesty and integrity among graduate students in social sciences. The specific objectives of the course are:

- Educate graduate students about the acceptable systematic approach to obtaining new and reliable knowledge.
- Suggest a decision framework that guides graduate students to be diligent about all the aspects of research misconduct and how to manage them.
- Develop a culture in which a graduate student is constantly making salient efforts to catch flaws in one's research work diligently.

Course Outline:

1. Knowledge
 - a. Positivistic vs. normativistic knowledge.
 - b. Private vs. public knowledge.
 - c. Ways to obtain knowledge.
 - d. Reliability of public knowledge.
 - e. The role of research in the discovery of reliable knowledge.
2. The Process of Research
 - a. Research defined and described.
 - b. Classifications of research.
 - c. Creativity in the research process.
 - d. Planning the research.
3. Responsible Conduct of Research
 - a. Examples of research misconduct in applied economics.
 - b. Maintaining accountability and upholding high ethical standards.
 - c. Collaborative research.
 - d. Research integrity and responsible authorship.
 - e. The ethics of writing and publishing in professional journals.
 - f. The ethics of giving professional talks.
 - g. Authorship, peer-reviewing, and plagiarism.

- h. Ethical issues in survey design, data collection, management, and analysis in applied economics research.
 - i. Data stewardship.
- 4. Other Protocols Related to Responsible Conduct of Research
 - a. Export controls.
 - b. International research.
 - c. Foreign influence.
 - d. Human and animal research regulations.
 - e. Intellectual property considerations in research.
 - f. Graduate Advisor–Advisee relationship.
 - g. Conflicts of interest.

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