

Thesis Project Portfolio

Academic Integrity in Crisis: A Systematic Analysis of Questionable Research Practices

(Technical Report)

Trust, Science, and the Digital War on Health Information

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The technical project and STS research together explore how vulnerabilities in the scientific research system contribute to the erosion of trust in the knowledge base. Both works examine the broader context in which research is produced and misinformation circulates. The technical component involves a systematic literature review, quantitative analysis, and the development of a taxonomy of questionable research practices to identify key threats to scientific integrity. This analysis is critical for understanding the root causes of research misconduct and its broader impact on public trust. Complementing this, the STS research investigates how digital platforms and social dynamics shape the creation, dissemination, and perception of medical knowledge, especially in the spread of health misinformation. In an ever-evolving information landscape, recognizing how flawed research and misleading content gain legitimacy is vital to safeguarding scientific credibility and promoting public health.

My technical work focuses on analyzing and categorizing questionable research practices (QRPs) in academic publishing. My team and I developed a comprehensive taxonomy, dictionary, and case study analysis that classifies and defines QRPs into individual practices, such as citation manipulation and peer review falsification, as well as organizational practices like predatory journals and paper mills. This framework aims to raise awareness and provide a structured approach to identify and address misconduct. Our work contributes to ongoing efforts to improve research ethics by providing a structured framework for identifying and mitigating these practices.

The STS research examines how digital platforms shape the production, dissemination, and interpretation of medical knowledge through the lens of the Sociology of Scientific

Knowledge (SSK). It explores how social, economic, and technological influence public understanding, particularly in women's health. Through case studies of Facebook, Twitter, and Instagram, the paper highlights how algorithms, culture, and content amplify emotionally resonant but misleading health narratives. The work underscores how engagement-driven ecosystems distort trust in science, commodify care, and reinforce systemic inequities. Together with the technical project on questionable research practices, this paper offers a critical perspective on how flawed knowledge circulates and becomes legitimized. In an ever-evolving information landscape, both projects stress the urgency of reinforcing scientific integrity and ethical digital governance to protect public health.

Working on my technical project and STS research paper simultaneously allowed each to inform and strengthen the other. My technical work, which focused on identifying questionable research practices, gave me insight into the structural flaws within scientific publishing. This enriched the foundation of my STS paper on digital health misinformation. In turn, applying the SSK framework in my STS research helped me see how these scientific flaws extend beyond academia, shaping public perceptions and influencing health behaviors on digital platforms. This combined perspective deepened my awareness of the full lifecycle of scientific knowledge and reinforced my commitment to promoting ethical, transparent information practices. Together, the two projects offered a holistic view of how integrity in research and communication is vital to trust in science.