Might Just Be My Everything: Research Outcomes Beyond Scholarly Articles

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Fig. 1. Our App Store Educational Technology as the reboot of the ACM's Ethical Simulator

We propose that artifacts and curricula are forms of research outcomes that go beyond written academic publications, and that recognizing these forms of research outcomes can improve the inclusivity and impact of the research community.

CCS Concepts: • **Human-centered computing** → **Interactive systems and tools**; • **Applied computing** → *Education.*

Additional Key Words and Phrases: datasets, neural networks, gaze detection, text tagging

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1 INTRODUCTION

The research community's current state of permitting only scholarly articles as valid, citable research outcomes serves as gatekeeping and is part of the systems that institutionalize inequities. The problem is multifaceted and manifests in the production, distribution, and consumption of the research paper. Everything from the tools necessary to draft the scholarly article, to composing in that genre, and producing the growing number of related items including high quality diagrams, and "optional, supplementary videos" further increase the tax on research outcomes. For this position, we select undergraduate students as an example population that is excluded, but acknowledge many others. Our position centers research outcomes in Human Computer Interaction, but we level the same accusations against other research communities. To illustrate our position we report on research related to teaching students about the ACM Code of Ethics [1] and using it to make and justify decisions.

2 BACKGROUND

In 2018 the Association for Computing Machinery published its new Code of Ethics and Professional Conduct (the "ACM Code"). The previous version of the ACM Code included educational materials titled the "Ethical Simulator" [8]. With the update to the code, the ACM communicated an interest in updated educational materials.

2.1 Upgrade Ethical Simulator?

Interested in a small evolution of the Ethical Simulator toward a branching narrative, a small team of undergraduates (supervised by two professors) undertook: (1) evaluating technologies for implementing branching narratives on the web and (2) thematic coding analysis of the ACM Code to produce an index that might map case studies or scenarios into relevant sections of the Code [5]. Even for the team of three undergraduate students, the semester seemed far too short for them to complete even these tasks (well short of the scholarly article outcome):

- learning about branching narratives and web technologies for implementing them
- learning about thematic coding and how to perform it
- documenting their process as they progressed
- learning about academic conferences and presenting research outcomes (including how to secure funding and travel to them)
- learning about the academic poster format and tools to create one
- presenting their work as a poster

2.2 App Store Educational Technology

In two subsequent semesters following these students' efforts, the first author completed (1) a literature review of ethics in technology prior to starting (2) the development of a prototype. The literature review included myriad related topics, e.g. Intellectual Property, Security, Privacy, Free Expression, Digital Civil Rights, and ethical frameworks such as Utilitarianism and Kantian ethics. For an entire semester, he reviewed one piece of literature on a certain ethical issue in computing to complete a sufficient sampling of the prior work.

In the next semester, this literature review and the work of the previous students informed the project as we pivoted from reviving the Ethical Simulator toward an educational technology that might be used in-class, or assigned as homework to prepare the students in advance of in-class discussion.

3 OUTCOMES BEYOND SCHOLARLY ARTICLES

Several of the students involved in this project, with the support of their supervising faculty members, have been successful publishing at least some proxy of their contributions. These publication efforts were often a compromise that both failed to accurately represent the primary contributions of the students and diverted some of their time from their more productive efforts. We do not argue that researchers should refrain from spending time writing about their work, but perhaps in common with others answering this workshop's call, we are concerned about the effort wasted by researchers shoehorning their work into the scholarly article.

Many of this project's contributions are artefacts which fall in the 'grey zone' between education and research. Such contributions tend to be hard to publish, yet may be very inspiring:

- thematic analysis of and annotated version of the ACM Code
- mapping of the old Ethical Simulator's branching narratives
- recovery script to rescue the Ethical Simulator from the Wayback Machine [8]
- collection of fictional Apps for a fictional App Store, which were designed to break a simple ethical dichotomy
- a proof-of-concept full-stack web application to serve as an educational technology

For each of these students, learning the nature of each piece of the research and design protocol, then executing on the protocol was already a significant commitment of time and a challenging educational experience that required they also learn about the culture of academia in which the enterprise is situated. The students were successful in producing documentation, datasets, designs (e.g. mock-ups) and functional prototypes. These outcomes in themselves are all excluded by the research community as valid outcomes.

3.1 Scholarly articles considered exlusionary

In addition to the issues of tools and formatting, the genre of the scholarly article and its variations across disciplines, e.g. permissibility of the first person, anonymization, jargon, higher vocabulary, and complex sentence constructions, serve as barriers to access and inclusion, even before the question of the publisher's access licenses.

4 RELATED EFFORTS

We see some parallels between the issues faced by our students in accounting for their work and the aims of some parts of the Open Science movement. For example the Center for Open Science's Open Science Framework (OSF), aims to make it possible for many individuals to contribute even if only to specific phases of a research project, and to cite this participation [4].

In terms of producing outcomes that can have a large but typically difficult to measure impact, the problems faced by the undergraduates is similar to those that motivate an interest in tracking the provenance of educational materials' adoption and adaptation, e.g. EduGit [7]. At our own university, which is a Primarily-Undergraduate Institution ("PUI"), some faculty members develop and maintain Free and Open Source textbooks, assignments, and whole curricula. Many of these educational materials have been adopted and adapted at hundreds of institutions, but the state of educational resource sharing neither emphasizes, nor facilitates citing sources, confounding efforts of measuring impact and bringing together the communities who use such artifacts.

In both of the Open Science and Open Educational Resource spaces, it seems that there are new opportunities for more inclusive research communities. Opening the gates of research outcome legitimacy to include contributions like those described in this position would permit a greater diversity of researchers to participate and to contribute

in new ways. In this way, the problem is analogous to that faced by HCI educators working in the lower-resourced environments of Primarily-Undergraduate Institutions [6] where precisely the same limitations that distinguish PUIs from research institutions also serve as valuable differences that expand the space of HCI Education.

5 CONCLUSION

The example project we used in this draft to highlight challenges of the scholarly article format continues still with capstone teams [2, 3], and even this continue work continues to illustrate the point as these students have difficulty communicating the through line from our earlier work since the contributions are largely not the focus of the related publications. The HCI research community includes researchers and work from so many disciplines and interdisciplinary spaces, that even more than other research communities we are suffocating under the scholarly article requirement. We must establish other types of artifacts such as software and hardware prototypes, datasets, and more as valid, citable research outcomes.

6 ACKNOWLEDGEMENTS

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