Interactive Research Artifacts as Creative Tools for Knowledge Creation

Amanda N. Curtis
amanda.curtis@oii.ox.ac.uk
Oxford Internet Institute,
University of Oxford, UK

In my doctoral programme, I aim to lay the foundations for understanding the novel impacts of interactive technologies on knowledge creation in the digital age. Specifically, I propose an ethnographic approach to understand current scholars' conceptualizations of "interactive research artifacts." Through this process, I will propose a definition and set of criteria for these artifacts that encompasses the dynamic ways these technologies transform knowledge creation practices. I will consider these artifact creation practices to be creative in nature, and as such, will draw on Design Studies and work on digital creativity to bridge computation, knowledge creation, and communications literature. I will begin with a pilot conference where scholars of all disciplines will be invited to share and discuss interactive research artifacts they have created. From there, I will use ethnographically-informed case studies to explore scholars' lived experiences with these artifacts. Based off these findings, I will propose a conceptualization of interactive research artifacts and initial design considerations. These will be examined and remoulded in co-design workshops, where, with more scholars, we will co-create design guidelines for the future creation of interactive research artifacts. To design for a future where interactive research artifacts become commonly used scholarly tools, an in-depth understanding of the ways these artifacts are used as knowledge creation tools is critical.

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1. Introduction

Academic knowledge creation practices are often excluded from discussions surrounding creativity. There is craft in exploring vast datasets, ideating hypotheses, constructing theories, and communicating knowledge. Interactive media are transforming the ways academic research is created, explored, critiqued, and disseminated. Therefore, these technologies should be understood as altering creative habits. This research seeks to conceptualize and further our understandings of these technologies as "interactive research artifacts" and creative tools.

Current literature in Human-Computer Interaction (HCI) focuses on the ways interactive media enhance and diversify how scholars communicate (Hohman et al., 2020); however, these studies do not address the critical role of knowledge creation and creativity. This research will unearth people's lived experiences using these tools and apply theories of design and knowledge creation to develop more complex understandings of the role of interactive media in scholarship.

The goal of this research is the development of new epistemologies for creative scholarly practices. Interactivity provides complex and unique opportunities to explore knowledge and we must leverage it to improve our research processes and knowledge infrastructures. I will lay the foundations of this future by developing complex, analytical understandings of how interactive research artifacts alter academic processes and how they should be created.

2. Literature Review

There exists no comprehensive research investigating the complexities of interactive research artifacts. Current research focuses on communicative affordances (Dragicevic et al., 2019; Hohman et al., 2020; Leggett & Shipman, 2004; Lundgren, 2011; Means, 2015; Rule et al., 2018). This literature misses critical ideas of creative practice and knowledge creation. For the scholars I interviewed, interactive research artifacts are valuable creative tools for knowledge creation, not necessarily communication (Curtis, 2022).

This research conceptualizes creativity as an individual notion – when people believe their work is creative, it is. This lens should be applied to academic knowledge creation. Designing a future that critically engages with interactive research artifacts as creative tools requires an understanding of scholars' lived experiences with them. To better understand the novel transformation of knowledge in the digital world, this project seeks to address the impact of interactive media on our changing forms of knowledge creation. Research currently explores creativity and communication in a digital age – this work exists as a slice of this, asking "what does scholarly creativity, communication, and knowledge creation together look like in a digital age?"

This project aims to address the following:

1. How and why do people engage with interactive research artifacts?
2. How do interactive research artifacts alter knowledge creation practices?
3. How should we create interactive research artifacts to best facilitate knowledge creation?

Design Studies orients itself as a creative discipline which focuses on humans' "lived worlds" (Boradkar, 2016); as such, this research aims to do the same. Design has long been a crossroads, building upon perspectives in other fields (McComb & Jablokow, 2022). This project is transdisciplinary by nature as the artifacts themselves are – they tangibly improve scholarly practices in a range of disciplines, including Computer Science and Digital Humanities. As such, I use design theories as the nexus. These design theories provide a perspective not traditionally found in science (Chou & Wong, 2015).

This work aims to co-create design guidelines for interactive research artifacts. Current tools to create these artifacts are often inaccessible to most scholars, designed with limited understanding of how these artifacts alter scholarly practices. With increasing emphasis on digitalization, more work is required to conceptualize and support the ways we construct scholarship. This design framework will promote accessibility of these artifacts, enabling a diverse audience of scholars to create and implement their own.

This research supports the integration of computation, creativity, and communication to provide unique perspectives on how digital technologies are changing creativity and scholarly knowledge. Developing a nuanced conceptualization of interactive research artifacts will lay the foundation for future studies, building towards normalization of these artifacts as knowledge creation tools, and therefore expanding the possibilities of our academic knowledge structures.

3. Methodology

To address the RQs, I will focus on communities which engage with interactive research artifacts. This work builds upon relationships established during my previous research (Curtis, 2022), where I identified scholars actively engaging with these artifacts, predominantly in Digital Humanities (e.g. Six Degrees of Francis Bacon, Oxford Academic Research Support Team), Media Studies (e.g. Brooke Leaves Home, Digital Creativity Labs), and Machine Learning (e.g. Distill, R2D3).

4. Expected Contributions

There exists no comprehensive research investigating the complexities of interactive research artifacts. Current research focuses on communicative affordances (e.g. Dragicevic et al., 2019; Hohman et al., 2020; Leggett & Shipman, 2004;

Lundgren, 2011; Means, 2015; Rule et al., 2018). This literature misses critical ideas of creative practice and knowledge creation. For the scholars I interviewed, interactive research artifacts are valuable creative tools for knowledge creation, not necessarily communication (Curtis, 2020).

This research has three stages: pilot conference, ethnographically-informed case studies, and co-design workshops.

Pilot Conference

I will run a make-a-thon conference as a pilot study. Participants from across the globe will create and share their own interactive research artifacts, providing initial insight into the ways scholars engage with these artifacts (RQ1) and the effects these creative practices have on knowledge creation (RQ2). I will follow individuals' creation processes and their interactions with others' artifacts. Throughout the event, I will identify more potential case study participants and better understand the communities shaped around these artifacts.

Ethnographically-informed Case Studies

Following insights from the pilot conference, I will construct ethnographically-informed case studies, addressing RQ1 and RQ2. These case studies will be purposefully diverse in discipline, content, and cultural context, but focused on those actively creating interactive research artifacts. Following Gillham's description of case studies, I will use multiple ethnographic evidence sources (2005) (participant observation, semi-structured interviews, critical artifact analysis) to construct thick descriptions of people and artifacts surrounding these cases. This study will follow actors, whether they are human (scholars) or non-human (artifacts and knowledge), through the unfolding processes of interactive research artifact creation.

By taking a case study approach, I aim to "understand the case in depth, and in its natural setting, recognizing its complexity and its context" (Punch, 2014, p. 120). Ethnography allows for insight into the "messiness of practice ... to try to understand the often ragged ways in which knowledge is produced in research" (Law, 2004, pp. 18–19). Directly engaging through semi-structured interviews provides insights into participants' relationships between interactive research artifacts and their research processes. Semi-structured interviews are a conversation in which knowledge is constructed and expose deeper meanings regarding interviewees' perspectives (Kvale & Brinkmann, 2009). Participant observation and critical artifact analysis will uncover tacit knowledge that might not be discussed during interviews (Hine, 2016).

Co-design Workshops

The final stage will be co-design workshops addressing RQ3. They build on participatory design methods and will enable users to co-construct design guidelines while maintaining intrinsically personal visions of outcomes (Andersen & Wakkary, 2019). I will generate initial ideas for designing future interactive research artifacts based off the conceptualizations brought forward by the case studies. From there, I will run a series of 3-5 workshops with 10-20 scholars each where we will co-design design guidelines for interactive research artifacts. These guidelines will serve as a framework for other scholars who are interested in creating their own interactive research artifacts but are unsure of where to begin.

4.1 Project Plan & Timetable

Year 1: Initial Planning and Pilot [currently in progress]

In my first year, I am identifying and finalizing my theoretical framing, methodological approach, and key case studies. I will also run the pilot conference, bringing together and initial list of participants based off my previous research and online recruiting. I hope to use this time to broaden the pool of scholars I am aware of who are actively creating interactive research artifacts and draft a database of examples.

Year 2: Ethnographically-informed Case Studies

I will expand upon insights from the pilot conference and begin conducting research for my ethnographically-informed case studies. After data collection, I will begin analyzing my findings and developing initial design guidelines to inform the co-design workshops.

Year 3: Co-design Workshops and Synthesis

In the beginning of the year, I will run a series of co-design workshops as outlined. From these findings, I plan to host additional workshops at relevant conferences to finalize the content and format of the design guidelines. I will focus on writing up and synthesizing co-design workshop outputs into a tangible design framework. I will produce a digital version of the framework which is easily accessible to all.

4.2 Outcomes, Deliverables, and Impact

Throughout my research process, I will continue to engage with the communities I am working alongside and feedback into their knowledge infrastructures. I am

an active member of multiple online Slack communities where members actively create interactive research artifacts. I will continue to participate in and run community events focused on knowledge exchange. After the intial pilot conference, I will publicly share my database of interactive research artifacts and invite others to submit their own. During previous research, a common frustration was a lack of examples to refer to. As such, I hope to create a space where scholars of all backgrounds can come to and investigate different forms of interactive research artifacts. Throughout my various stages of synthesis, I will ensure to keep my findings available online, both in the communities I am directly working with and to a broader audience.

Further, I aim to present initial findings of the conference, case studies, and co-design workshops in relevant academic conferences. My synthesized findings will be published in peer-review papers, to increase awareness of this phenomenon inside academia. As my work purposefully blends multiple disciplines, I will aim to participate in conferences and journals across a spectrum of fields.

References

Andersen, Kristina, & Wakkary, Ron. (2019). The Magic Machine Workshops: Making Personal Design Knowledge. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems,* 1–13. https://doi.org/10.1145/3290605.3300342

Boradkar, Prasad. (2016). Design + anthropology: An emergent discipline. In P. Sparke & F. Fisher (Eds.)*, The Routledge companion to design studies.* Routledge, Taylor & Francis Group.

Chou, Wen Huei, & Wong, Ju-Joan. (2015). From a Disciplinary to an Interdisciplinary Design Research: Developing an Integrative Approach for Design. *International Journal of Art & Design Education, 34*(2), 206–223. https://doi.org/10.1111/jade.12017

Curtis, Amanda. (2020). *Understanding Interactive Research Artifacts as Tools for Knowledge Creation* [MSc Thesis]. University of Oxford.

Curtis, Amanda. (2022). Explorations of Interactive Research Artifacts in Use: Applying Research through Design to Understand Ways Scholars Leverage Interactivity in their Research Practices. *In Creativity and Cognition (C&C '21). Association for Computing Machinery.* https://doi.org/10.1145/3527927.3532812

Dragicevic, Pierre, Jansen, Yvonne, Sarma, Abhraneel, Kay, Matthew, & Chevalier, Fanny. (2019). Increasing the Transparency of Research Papers with Explorable Multiverse Analyses. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* - CHI '19, 1–15. https://doi.org/10.1145/3290605.3300295

Gillham, Bill. (2005). *Case study research methods* (Repr). Continuum.

Hine, Christine. (2016). Ethnographies of Online Communities and Social Media: Modes, Varieties, Affordances. In *The SAGE Handbook of Online Research Methods* (2nd ed.). SAGE Publications.

Hohman, Fred, Conlen, Matthew, Heer, Jeffrey, & Chau, Duen.
(2020). Communicating with Interactive Articles. *Distill, 5*(9), 10.23915/distill.00028. https://doi.org/10.23915/distill.00028

Kvale, Steinar, & Brinkmann, Svend.
(2009). *InterViews: Learning the craft of qualitative research interviewing* (2nd ed). Sage Publications.

Law, John.
(2004). *After method: Mess in social science research*. Routledge.

Leggett, John J., & Shipman, Frank M.
(2004). Directions for hypertext research: Exploring the design space for interactive scholarly communication. *Proceedings of the Fifteenth ACM Conference on Hypertext & Hypermedia - HYPERTEXT '04*, 2. https://doi.org/10.1145/1012807.1012812

Lundgren, Sus.
(2011). Interaction-Related Properties of Interactive Artifacts. *Proceedings of Ambience 11*. Ambience 11.

McComb, Christopher, & Jablokow, Kathryn.
(2022). A conceptual framework for multidisciplinary design research with example application to agent-based modeling. *Design Studies, 78*, 101074. https://doi.org/10.1016/j.destud.2021.101074

Means, Bernard K.
(2015). Promoting a More Interactive Public Archaeology: Archaeological Visualization and Reflexivity through Virtual Artifact Curation. *Advances in Archaeological Practice, 3*(3), 235–248. https://doi.org/10.7183/2326-3768.3.3.235

Punch, Keith.
(2014). *Introduction to social research: Quantitative & qualitative approaches* (Third edition). SAGE.

Rule, Adam, Tabard, Aurélien, & Hollan, James D.
(2018). Exploration and Explanation in Computational Notebooks. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*, 1–12. https://doi.org/10.1145/3173574.3173606