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Write or wrong

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Write or Wrong: A Transformational Game for Ethics Education (2000 words)

Rapid advances in science and technology, especially in domains that have the potential for large public impact (e.g., AI, genetics), have led to increased attention on the ethical dilemmas that arise from such work. Private companies and public research institutions have both begun to address these dilemmas and what is currently acknowledged as a current lack of adequate ethics resources for addressing them. Technology leaders like Google, for example, have attempted to establish (and subsequently dissolve) ethics boards or panels (Piper, 2019), and research organizations such as the League of European Research Universities have advanced new initiatives for improving the research integrity culture at universities (Lerouge & Hol, 2020). Across disciplines, industries, and agencies, there is a widely acknowledged need to rapidly improve how we handle the ethics of the new innovations and technologies.

Undergraduate and graduate student ethics education programs face some of the greatest challenges in improving how we prepare undergraduates and graduate students for the ethical dilemmas they will face as they move into research and development, whether in private industry or public research institutions. While these ethics education programs have generally improved over the past twenty years (Watts et al., 2017), many issues remain, such as a lack of clear guidelines for developing ethics training programs, little accountability for failing to train students, and a lack of differentiation across disciplines (Phillips et al., 2018). Ethics education courses tend to be broad, abstract, and or focused on historical cases, rather than connected to students' current or future disciplinary or professional practices (Gille & Nardo, 2020).

Over the past twenty years, game-based learning has made significant advances in professional development games, which may be particularly useful in improving ethics education programs that aim to prepare students for professional ethical decision making. Epistemic games, for example, have been designed around disciplinary epistemologies to provide players with opportunities to experience ways of thinking, being, and acting that are tied to a particular professional practice (Markauskaite & Goodyear, 2017). In an epistemic game, players might, for example, learn to see the world from the "epistemological lens" of a city planner through game play that simulates relevant professional activities (Shaffer, 2005). Developing games that convey the ethics of a profession may follow an approach similar to epistemology-oriented game-based learning.

Prior research has already suggested that games may be a potentially powerful way to introduce players to ethical dilemmas (Sicart, 2013), and that they may be particularly useful given the similar structures of epistemic games and typical ethics education's use scenarios or cases (Bagdasarov et al., 2013; Richards & Gorman, 2004). STEM ethics education in particular has had game principles applied, however this work is both nascent and challenging with significant work remaining to develop working models of ethics education game designs and pedagogy (Briggle et al., 2016; Nardo and Gaydos, 2021). In this project, we introduce an ethics education game being developed as a part of one European University's initiative to improve graduate student research ethics education, briefly describe the theoretical and design approach we've taken, and present preliminary data collected from two pilot studies with early users.

Write or Wrong: Design

Write or Wrong (WoW) is a 2d simulation game that walks students through four years of graduate student research life, with game play taking place primarily at a computer in a student's imagined lab (Figure 1). The game is focused on ethical decision making associated with publishing research and presents players with key decisions being made around activities

like whether to spend time reading background material (i.e., journals, books), taking courses to improve their writing, resting, or directly writing papers to publish.

The game is designed to be used as a part of a research ethics course required for all incoming graduate students. As others have pointed out (e.g., Aubert Bonn & Pinxten, 2019), ethics education programs often focus on ethics in terms of individual responsibility (e.g., compliance with appropriate research practices). In contrast, *WoW* adopts more systemic perspective, focusing on individuals' actions relative to the systems in which researchers operate. Ideally, through understanding these systemic pressures, students can better anticipate and critically examine the ethical dilemmas they face. Because the course game is used in is cross-disciplinary, the ethics addressed in the game were related to publishing research, as publishing was thought to be common for all disciplines. Specifically, we focused on the ethical decisions associated with research honesty, authorship, and originality.

Write or Wrong: Theory

The theory of learning used for *WoW* draws on two key ideas - 1) that real-world ethics problems are often wicked, resisting a clear "correct" answer and sometimes requiring resolution (Sicart, 2013) and 2) that games can support learning through experiences that are transformational, presenting players with experiences that don't fit with their prior understandings of the world (following a Deweyan understanding of educational experiences as based on experiencing and reflecting on discontinuity, English 2013). To introduce players to real-world ethics issues, the game is designed to first guide players through the decisions that are germane to research publications. As the game progresses, players will be increasingly confronted with social and institutional pressures that researchers might feel associated with publishing. In order for players to learn more formally from these experiences, that is, to confront discontinuities of understanding and connect game play to professional discourses, the players are expected to participate in a formal ethics course. In this way, the game is intended to provide experiences that prepare students for future learning which in turn could be supported by classroom activities. As the game's basis for learning depends on the players' understanding of the game experiences, our preliminary research begins with this investigation - How do players make sense of the game?

Methods and Results

To understand how players make sense of the game, we conducted two pilot studies. In the first study, six participants were recruited to play-test the game from the graduate student body at a large research-oriented university in Europe. Playtests took approximately sixty minutes. During the play test, participants were asked to play through the game and verbally articulate their thoughts in as much detail as possible, including the rationale behind their actions and decisions, as well as their general impressions of the game. Participants were allowed to ask questions to the researcher throughout the process and were periodically asked questions about what they were thinking as they played. We collected video recordings of the gameplay which were then transcribed. The playtest was conducted in English.

The goal for these play-tests was to better understand how players made sense of the game relative to their research practices. To do this, we reviewed and coded the transcripts of player discussion and identified responses that could answer the questions: 1) How do players talk about the game? and 2) How do players relate the game to graduate research? These portions of the transcripts were then organized into three emergent themes (Saldana, 2009): affect (i.e., how the game made them feel), real-world research structures (i.e., how feedback is typically provided in research), and agentful action (e.g., what players typically do in their research).

Overall, we found that the game was a useful lens through which students could reflect on their research. In their discussion, participants drew connections between the game and their own fields (e.g., discussing how their field views journal vs. conference papers) as well as research practices in their own lab (e.g., referring to how digital practices that help them to maintain work focus). Notably, all participants articulated feeling the pressure to perform academically in the game, comparing it to their own experience as doctoral students.

In the second study, 30 undergraduate students at a small liberal arts university in Japan who were participating in a course about learning and technology were asked to play the game as a part of their homework. Prior to and after game play, students were asked: "What might a researcher consider as important for ethics when writing research papers? List as many as you can think of. For each, provide a brief description of why and how it is important." The assignment was a part of class and participation in the research component was voluntary. Of the 30 students, 12 returned consent forms allowing us to use their responses as data.

To understand whether and how students' views on research changed through game play, the student pre-game and post-game responses were compared, the differences summarized and coded and then thematically organized (Saldana, 2009). Ten students copy and pasted their responses from pre- to post-questionnaire, adding new ideas after game-play. One student did not submit a pre-game survey response and one student's responses changed entirely. From their responses, the following themes of ethically significant scientific practice emerged: good writing (e.g., appropriate citations, quality), planning (e.g., anticipating deadlines), being mental and physical healthy (e.g., fatigue may promote unethical practices), and the importance of social elements (e.g., academic discourses, communicating).

Discussion

In the first study, the participants were graduate students who were already familiar with research practices. As such, they were able to quickly draw comparisons between the work of research and the game content. In particular, they spontaneously drew comparisons between the ways in which the game structure and research structures differed or aligned from their experiences, such as when one player commented on how post-doctoral scholars should be the most knowledgeable in the lab and able to provide mentorship to younger researchers. The players noted differences between what they do to navigate these research structures, such as when one player noted that in-game email correspondence was distracting and was something that they avoided in their lives in order to focus on their work. The game, in this way, seemed to serve as an adequate platform for prompting discussions about the circumstances of research as well as tactics for success.

In the second study, the participants were undergraduates with little or no prior research experience. These participants' responses highlighted more surface-level aspects of the game in their interpretations of ethics and research. For example, the game presents players with different ways to advance publishing skills (e.g., taking writing classes), opportunities to collaborate on papers with peers while meeting strict deadlines, and regular warnings to be mindful of their mental health (e.g., too much work results in incoherent whispering that gets louder). The players' responses generally aligned with the game's mechanics, particularly in their post-game responses.

Conclusion

WoW is intended to present players with a simulation of basic research publication practices that can be used as a springboard for future discussions around related ethics. The

work presented here provides an early look at how players understand *WoW* gameplay, which we view as an important first step in better 1) integrating new ethics dilemmas into the game and 2) developing supporting classroom materials that help players connect their game and professional experiences. The game is not intended to be a standalone experience through which players learn pre-determined content and the undergraduate students' responses, in particular, show how the game can lead players to unintended conclusions. Specifically, their focus on more superficial aspects of research practices may inadvertently place the burden of ethical action on the individual rather than on the system. For example, one undergraduate student responded that it's important to "plan how you develop your writing" especially so as not to miss deadlines and "sacrifice health." These pressures were already well-understood by the graduate researchers, who, relative to game play, could readily discuss how they deal with them on a daily basis. Both undergraduate and graduate player responses thus supported the game as capable of conveying the competing pressures that arise from one's personal and professional life. We feel, however, that further discussion is needed for players to critically examine the structures that give rise to these ethical dilemmas in the first place.

Figures



Figure 1: The main screen players see in the game intended to convey the experience of graduate student office work.

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