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Applied Ethics for Instructional Design and Technology

DESIGN, DECISION MAKING, AND CONTEMPORARY ISSUES

edited by
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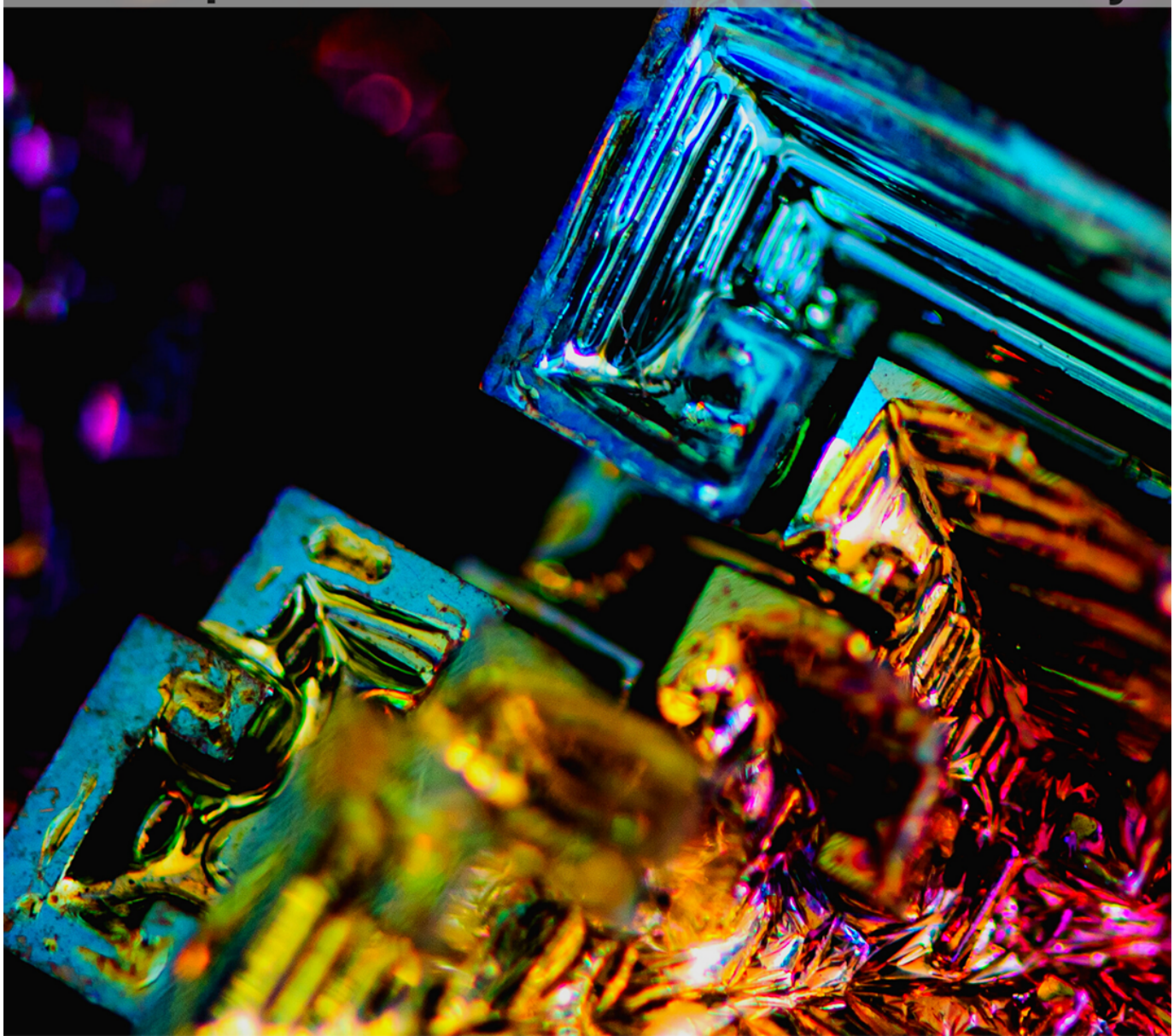

Applied Ethics for Instructional Design and Technology

Design, Decision Making, and Contemporary Issues

Moore, S. L. & Dousay, T. A.

Applied Ethics for IDT is an invitation to a conversation situated at the nexus of ethics, technology, and learning. This conversation is both a critique and a call to action focused on the intricate relationship between ethics and the field of instructional design and technology. Organized into two sections, the book first explores practices that integrate ethics into decision-making processes and practices. The second section invites the reader to critically examine ethical issues in situated contexts. The multifaceted ethical challenges presented in this text implore the reader to consider the realities instructional designers face in a rapidly evolving digital learning landscape and take responsible action with their newfound perspective.

Decision-making
Design
Educational Technology
Ethics
Instructional Design

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AI-Driven Instructional Design: Ethical Challenges and Practical Solutions

Reframing Ethics as Design and Decision Making: Introduction and Overview of Applied Ethics for IDT

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Design Ethics Instructional Design

Although ethics featured prominently in early literature in the instructional design and technology (IDT) field, as represented by classics curated by Ely & Plomp, it has been a long-neglected area of scholarship. More recently, however, we are witnessing a great expansion of work in this area, as scholars raise attention to issues such as data rights and privacy, accessibility, and even societal impacts of educational technologies such as systemic inequities, erosion of personal rights, and environmental impacts both from energy consumption and from over-sold hardware with toxic components ending up in landfills. In this collection, we seek to center the work of many scholars exploring various aspects of this multi-faceted topic as essential to the work we do as professionals – both as professional scholars and

as professional practitioners. We also seek to encourage broader future scholarship and support the integration of ethics into IDT curricula and training through an open collection. Finally, we also seek to encourage an approach to ethics that is not an over-simplified dichotomy of "right" and "wrong" but rather as dimensions of the IDT design process and inherent in the problems and projects we work on, requiring quintessential IDT skills of analysis and synthesis to devise solutions that account for a range of impacts of professional practice. To that end, we have invited authors whose work extends scholarship on IDT ethics and focuses on the ethical considerations, including the social impacts, of our work.

Ethics for IDT: A Long-Neglected Gap

Definitions of the instructional design and technology (IDT) field have long included ethics, such as the 1977 definition that emphasized educational technology as situated in the larger context of society, advocating for being a "concerned profession" about the uses and applications of technology in learning contexts (Ely & Plomp, 1996). That definition had 16 parts, two of which focused on ethics – parts 9 and 11. Part 9 focused on the need for a professional association to "develop and implement the standards and ethics, leadership, and training and certification characteristics of the profession" (Ely & Plomp, 1996, p. 13). Part 11 stated that "Educational technology operates within the larger context of society" and further advocated that the profession is one "concerned about the uses to which its techniques and applications are being put," articulating positions against stereotyping in materials and in support of intellectual freedom, affirmative action, and using technology in support of "humane and life-fulfilling ends" (Ely & Plomp, 1996, p. 13). The 2004 definition established ethics as a co-equal companion to research and technique, defining educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (AECT, 2004, p. 3).

In the curated readings in Ely & Plomp's Classic Writings in Instructional Technology that captured early conversations on the formation of the IDT profession, several authors raised ethical and social issues and professional responsibility as essential considerations and features that distinguished a profession. Davies, for example, argued that:

> *"Technology, contrary to popular belief, is not necessarily confined to the means (sic) by which educators realize their ends. Technology also raises anew questions about the nature of the ends themselves. It forces us to reflect on the morality of what we are about, by its very insistence on defensible choices. By opening up the range of possibilities, technology in and of education has caused us to reflect upon, and sometimes to reconsider, the manner in which selections are made, as well as the purposes for which they are being considered. In other words, the very richness of alternatives now available to us, together with potential for increased effectiveness, forces us to reflect on the ethical nature of what we have in mind. Unfortunately, the deep satisfaction, sense of creativity, and feelings of accomplishment that can be expressed in the doing of educational technology are too often preferred to the related, but very different, pleasures of contemplating educational technology. Yet contemplation and responsibility go hand in hand, one without the other is meaningless." (Davies, 1996, p. 15-16, emphasis in original)*

Davies further argued that the field should not only develop techniques but also engage in continual contemplation and reflection on the nature of technology and the work of the professional in learning and educational contexts. He asserted, "What is 'best' is not only a technological question but also an ethical one. A defensible choice, at the very least, involves addressing both of these issues" (1996, p. 16), concluding that the ability to make choices involving a range of technological alternatives was of increasing importance to both the theory and practice of education. In that same collection, Finn (1996a, reprinted from 1962) similarly argued that philosophical inquiry about the nature of ends and means was central to IDT's status as a profession, as technology demands we be able to answer questions such as what is desirable and why, and what makes the pursuit of technology in education worthwhile (Finn (1996b, reprinted from 1953) also laid out six criteria to define educational technology as a profession, the fifth of which was a series of standards and a statement of ethics which is enforced.

The same concern over the worthwhileness and professionalization of the field also motivated the work of Kaufman, who argued that:

> *"We are not in a vacuum, and our results are seen and judged by those outside of the schools – those who are external to it. … This external referent should be the starting place for functional and useful educational planning, design, implementation, and evaluations – if education does not allow learners to live better and contribute better, it probably is not worth doing" (1996, p. 112)*

Kaufman evolved his work over the years into a planning model, starting with societal impact and aligning desired societal impact into operational and tactical planning and evaluation (2000).

The "Ethics Boom" That Wasn't for IDT

Despite the centrality of ethics in the definitions and conceptualization of our work as a profession, for many decades, ethics was a dramatically under-developed topic in the literature (Moore & Ellsworth, 2014) and has been absent in instructional design and technology models (Moore, 2021). In the Seels and Richey definition published in 1994, only a page and a half were dedicated to ethics in the profession, despite its persistent presence in the field's historical definitions. Their discussion was mainly devoted to copyright and fair use, which are more accurately considered legal considerations emphasizing compliance with rules. The 2004 revision to the definition resulted only in some updates to the code of ethics maintained by the Association for Educational Communications and Technology (AECT). The primary work of ethics in IDT centered around the creation and maintenance of a code of ethics, which originally focused primarily on individual behavior and became increasingly situated in the context of the AECT organization rather than integrating ethics into central methods and techniques or supporting practitioners in contemplative practice, regardless of their organizational membership.

During this same timeframe, other fields experienced what Davis (1999) described as an "ethics boom" as they confronted national scandals, technological advances, and public issues with professional conduct. Medicine started integrating ethics into their curricula as physicians increasingly faced ethical dilemmas, such as whether to invest in a new, expensive technology that could save the most critically ill patients or spend that same money instead on a clinic that could serve more people. The Watergate scandal in the United States, where lawyers advised a president on and aided in the cover-up of a break-in, forced the legal profession to re-examine their professional standards, leading to the American Bar Association mandating ethics courses in law programs. Engineering soon followed suit as bribery scandals involving civil engineers and falsified testing records for airbrakes supplied by B.F. Goodrich to the Air Force led to calls for changes to the preparation of professional engineers. Other professions have also considered ethics an essential part of the professional curriculum for practitioners for over three decades (Davis, 1999). In 2005, Moore documented that similar integration of ethics into IDT programs in the US and Canada had not taken place yet, situating IDT as lagging behind the developments in other disciplines.

These drivers led not only to curricular changes in other disciplines but also changes in how these other fields approached ethics. Instead of emphasizing ethics as purely a philosophical pursuit or a matter of compliance with rules, each of these fields sought to define what constituted "practical ethics" or "applied ethics" for their field. This approach differs greatly from requiring students to learn different philosophies or limiting emphasis to a code of ethics. In engineering, for example, Whitbeck (1996) coined the term "ethics as design" and argued that treating ethics as a form of evaluation or judgment misses the myriad of ways ethical problems are similar to design problems and are an embedded feature of engineering design. Engineering also has developed frameworks for embedding ethics in the work of professionals. For example, the IEEE publication Ethically Aligned Designed does not focus on a code of ethics but instead contemplates the ethical and social dimensions of intelligent and autonomous systems and aims to support engineers in embedding ethical considerations (such as personal data rights, individual control, and well-being) as parameters and constraints that shape the development of such systems.

In IDT, Yeaman et al. (1994) sought to expand AECT's code of ethics beyond individual behavior to incorporate social responsibility of the profession. They observed at the time that the field lacked any incorporation of ethics into research and practice, stating, "there is definitely nothing wrong with liking and advocating educational technology. It is good to find better ways of doing things. Nevertheless, it is important that better should include the qualities of being ethical and more humanizing" (1994, p. 12). However, any resulting work on ethics remained confined to edits of the AECT code of ethics.

Moore (2021) documented how that code of ethics has failed to translate into any models representing IDT practice and techniques, revealing a significant gap between the code of ethics and what is taught and modeled as professional practice. This is not surprising, as research on codes of ethics routinely demonstrates their failure to translate into practice (Boatright, 2013; McNamara et al., 2018). Guersensvaig (2021) observed that codes reflect a normative approach to ethics and can fail to account for multiple perspectives and contextual factors that influence their application in practice. He argued that professional ethics are "a larger endeavor" than codes and are "open to substantiated disagreements emanating from the multiple perspectives that may participate in the discipline" (2021, p. 51). That "larger endeavor" can be seen in recent trends in professional ethics – especially in technology- and design-oriented disciplines, such as the engineering examples cited above – that focus less on codes, philosophy, or individual moral development and more on the applied and practical nature of ethics as embedded in professional practice. Ethics have been reframed as a form of design where synthesis is essential in addressing broader social problems and ethical issues in practice (Whitbeck, 1996) and as a form of reflective practice where interrogation and analysis inform solutions that professionals creatively devise (Moore & Tillberg-Webb, 2023; Lachheb et al., 2023; Moore et al., 2024).

An Emergent Ethics Boom in IDT

Despite multiple attempts to reinvigorate the ethics discussion in IDT (Yeaman et al., 1994; Yeaman, 2006, 2013, 2015), the recent proliferation of advanced technologies has triggered active discourse around ethical considerations. While the issues are not new, affordances from and access to technologies such as learning analytics, proctoring solutions, and artificial intelligence for education (AIed) add a new dimensionality to previous conversations. Prinsloo and Slade (2013; also Slade and Prinsloo, 2013) and Pardo and Siemens (2014) initiated conversations on ethics and privacy issues as learning analytics prompted concerns about data rights, security, dignity, and integrity. Similarly, the 2016 special issue of Educational Technology Research & Development dedicated to the ethics and privacy in learning analytics (Ifenthaler & Tracey, 2016; Willis et al., 2016; Scholes, 2016; West et al., 2016; Lawson et al., 2016) was among the first special issues in a journal to host a focused conversation on ethical issues. Work on various aspects of privacy and learning analytics continues today as evidenced by the work of Blackmon and Moore (2020), Jones (2019) Marshall and colleagues (2022), and Lachheb and colleagues (2023). Underlying these technological enhancements, societal and cultural shifts also contribute to the renewed interest in ethical concerns with social, political and cultural ramifications.

While inequalities at all education levels existed before the pandemic, the mass shift to emergency remote teaching (Hodges et al., 2020) catalyzed attention regarding other types of ethical issues in IDT. Largely driven by the increased use of online learning platforms that often exacerbated existing inequalities, a Pew Research Center survey in the United States found that 36% of teenagers from lower-income households did not have access to a computer at home and were unable to complete schoolwork (Vogels et al., 2020). If not for cell phones or public wifi, an even more of the lower income students would not have been able to complete their school work. A closer examination of the racial disparities reveals that black and Hispanic families were more likely to experience dilemmas, being less likely to be able to work while children were required to engage in at-home, online learning (Gould & Shierholz, 2020). Unfortunately, schools and universities suspended or significantly reduced accessibility accommodations and considerations during emergency remote teaching (Becker et al., 2020; Custodio, 2020).

The confluence of rapid technological advancements and the height of critical pandemic reflection has produced more publications and discourse on diversity, equity, and inclusion. Recognizing the immediate and broader implications, the Journal of Applied Instructional Design published three special issues on diversity and inclusion (2021), accessibility and UDL (2022), and social justice and change (2023). Several manuscripts promote adapted ADDIE processes that integrate diversity, equity, and inclusion (DEI) or refocus instructional design on inclusivity (e.g., Collier, 2020; Gamrat et al., 2022). Additionally, several teaching and learning centers launched repositories, resources, and workshops or institutes on integrating diversity and inclusion considerations into technology selection and use, pedagogy, and assessment. For example, the University of Rhode Island's Office for the Advancement of Teaching and Learning (n.d.) provides resources for designing assignments, peer observation, teaching online, and how to approach technology, teaching, and AIEd. Similarly, San Francisco State University's Center for Equity and Excellence in Teaching and Learning (n.d.) engages faculty participants in a self-paced online course about teaching writing based on pedagogies for inclusive excellence.

The field of IDT has reached a tipping point regarding ethics in practice. Moore and Tillberg-Webb (2023) published the first textbook on ethics and educational technology, advancing an ethical framework focused on reflection, interrogation, and design. Their framework also takes a socio-technical approach to educational technology, acknowledging the social, cultural, and other value influences on technologies. In other words, technologies are both developed and applied in social, cultural, and political contexts that influence decisions on design, selection, implementation, and evaluation. Moore and Tillberg-Webb distilled their book down into a chapter in the most recent Trends & Issues book (Rieser & Carr-Chelman, 2024) along with specific strategies for how designers can embed ethics in practice. This chapter marks a shift in the discourse, as it replaced a previous chapter approaching ethics as compliance with rules. Their framework components emphasize how designers engage in different types of reflection, such as reflection-in-action and reflection-after-action (Schön, 1983). Additionally, the framework invites users to engage in a critical analysis of technologies to better identify harms that inform design, selection, implementation, and evaluation decisions and outcomes. The works by Moore and Tillberg-Webb turn attention away from ethics as compliance with codes and regulations toward a broader concept of professional ethics as a form of design and a function of practice with pragmatic implications.

Ethics as Professional Practice

A community of scholars and body of scholarship on applied ethics in IDT is clearly emerging. These emergent bodies of scholarship do not emphasize maintaining and adhering to codes but rather take a design-oriented approach to addressing ethical issues. Reframed this way, ethics function as design considerations and constraints that influence decisions and artifacts, whereby designers do "ethics by other means" (Verbeek, 2006). Whitbeck argued that ethics are too often confined to the role of judgment or evaluation when, in fact, ethics require synthesis. She explained that both ethical problems and design problems are very similar: for both, there is rarely one unique or perfect solution, and instead, there is a range of possible solutions. Those possible solutions balance trade-offs differently, and individual designers will vary in how they balance and frame these issues, thus deriving different solutions (Svihla, 2020).

The range of possibilities and the variation between individuals based on their values, priorities, ethical perspectives, processes, and so on reflect the very sort of intellectual and ethical diversity described by Guersensvaig (2021). Rather than "the judge's perspective" where blame is assigned for failures and solutions are characterized in absolute "right" or "wrong" terms, ethics reframed through the lens of design focuses instead on how practitioners creatively devise solutions to complex learning problems that include ethical and moral dimensions and to complex moral and ethical problems that include learning dimensions (Whitbeck, 1996). Furthermore, this approach recognizes that ethical considerations can be in conflict or tension with one another, requiring designers and practitioners to devise possible options the same way they navigate other design constraints and parameters.

In This Book

We are very excited about the contributions to this book. As we read each submission and saw the book come together as a cohesive set of works, we were increasingly excited about the discourse, frameworks, and insights represented in this volume. The conversation begins in the first section with a focus on integrating ethics into design and decision-making processes and practices. These authors support an applied approach for IDT across different contexts. Gray lays a rich foundation for the entire book, starting with the idea of instructional designers as ethical mediators. He states, "design is an ethical act" and helps us see design anew as a method we use to change current realities into desired realities. He explores how designers incorporate values into their processes and design outcomes and how being an "ethically aware" designer can better support one's ability to confront the ethical dimensions inherent in professionals' work with technology. Warren et al. then present a decision-making support tool – the Ethical Choices with Educational Technology (ECET) framework – specifically developed to support teachers in K-12 contexts. They developed their tool by working directly with teachers as key stakeholders to derive a teacher-friendly approach to incorporating ethical considerations into technology selection and classroom use. Stefaniak then tackles the documented shortcomings of instructional

design models and their persistent prior failures to incorporate systemic impacts. She proposes an overlay for instructional design models to support ethical decision-making that also embodies the non-linear and iterative nature of design, providing very practical insights into how instructional designs can embed ethics into practice. Finally, Moore and Tillberg-Webb draw upon their framework of reflection, interrogation, and design to identify specific design practices designers can use to integrate ethics into everyday design. They explore ethics as a form of reflection-in-action, problem framing, ethical analysis, design philosophies, and stakeholder involvement as an “ethics-in-design toolkit” with specific examples and tips for designers. These chapters could each be easily incorporated into instructional design courses, workshops, and team projects to “overlay,” as Stefaniak envisions, ethics onto design methods and activities.

In the book's second section, we delve into specific ethical issues such as environmental impacts, racial and cultural considerations in design, justice, and rights for data use and analytics, and navigating ethical considerations of learner autonomy in online learning. Warren and colleagues offer much-needed discussion on the environmental impacts of educational technology. Their paper prompts professionals to consider climate change and educational technologies' ecological impacts, which “hides behind product ordering interfaces with simple pricing.” We hope this piece spawns a greatly expanded conversation and body of scholarship with implications for practice and decision-making. Amy Lomellini and colleagues tackle a topic that has long been discussed, but mainly approached through legalistic and compliance orientations. They discuss how this is a limited and limiting approach, inviting instructional designers to approach accessibility through more of a design mindset which embraces the iterative nature of devising solutions.

Edouard’s chapter embodies the spirit of creativity and imagination that ethical considerations can evoke as he explores a makerspace designed to foster the creativity and world-building of racially minoritized learners, especially Black children. His chapter provides a specific example of how ethical considerations – namely of race and equity – directly informed the design, development, and implementation of a makerspace for university and school-aged residents in West Philadelphia in the United States. Greenhalgh then challenges us to move beyond “superficial nod[s] to questions of justice, harm, and power” to explore deeper assumptions about data ethics. He uses four broad questions about purpose (of education and of educational technology), quality, and voice to illuminate ways in which designers can move beyond surface-level treatments of data rights and privacy. Greenhalgh’s piece echoes Davies’ concerns and answers Davies’ call with an example of how we understand the relationship between technology and education and how we can better question how technology shapes education’s purpose and outcomes.

Finally, Scholes exemplifies an ethics-as-design approach as she identifies how strategies that better support adult online learners can also carry risks for learners. She models how designers can identify ethical issues that create tensions - or conflicts between different design parameters – and provides ideas for how designers may navigate the need to make trade-offs through various design possibilities. Although her piece may focus on a particular context and set of design considerations, Scholes’ piece serves as an excellent example of how designers can identify ethical issues in any context and then use design methods and ideas to generate possible solutions. The last chapter in our collection, by Sankaranarayanan and Park, addresses recent concerns and practical approaches to the role of generative

artificial intelligence (AI) technologies in instructional design practices. Moving beyond simply naming and identifying concerns, this chapter offers a rich array of practical strategies that designers can employ during different design tasks related to AI, both as a tool supporting instructional design and as a set of decisions on whether and how to use AI in educational contexts.

Reaching Further

In his poem Andrea del Sarto, Robert Browning writes, "A man's reach must exceed his grasp / Or what's a Heaven for?" We wish to close by emphasizing that ethics are not about attaining perfection or not failing to live up to some standard. Instead, it is about our attempts to strive for more and better – they are aspirational. We will certainly fall short of ideals as we endeavor to do better. But we will get much further than if we don't try to reach for a better vision of human flourishing as it may be enabled by educational technologies. And so, in that spirit, we thank the authors of this volume for helping us as a field and as individual practitioners to reach further and do better. And we invite you, the reader, to join us on this iterative journey of continually endeavoring to do better and reach further. Let's go!

References

Association for Educational Communications and Technology (AECT). (2020). The Code of Professional Ethics. Association for Educational Communications and Technology. https://members.aect.org/Intranet/Publications/ethics/

Becker, S. P., Breaux, R., Cusick, C. N., Dvorsky, M. R., Marsh, N. P., Sciberras, E., & Langberg, J. M. (2020). Remote learning during COVID-19: Examining school practices, service continuation, and difficulties for adolescents with and ADHD. *The Journal of Adolescent Health, 67*(6), 769–777. https://doi.org/10.1016/j.jadohealth.2020.09.002

Blackmon, S. & Moore, R. (2020). A framework to support interdisciplinary engagement with learning analytics. In D. Ifenthaler and D. Gibson (Eds.), *Adoption of data analytics in higher education learning and teaching* (pp. 39-52). Springer. https://doi.org/https://doi.org/10.1007/978-3-030-47392-1_3

Boatright, J. (2013). Swearing to be virtuous: The prospects of a banker's oath. *Review of Social Economy, 71*(2), 140-165. https://doi.org/10.1080/00346764.2013.800305

Collier, A. (2020, Oct. 26). Inclusive design and design justice: Strategies to shape our classes and communities. *EDUCAUSE Review*, https://er.educause.edu/articles/2020/10/inclusive-design-and-design-justice-strategies-to-shape-our-classes-and-communities

Custodio, J. (2020, April 7). Disabled students already faced learning barriers. Then coronavirus forced and abrupt shift to online classes. *The Chronicle of Higher Education.* Retrieved from https://www.chronicle.com/article/disabled-students-already-faced-learning-barriers-then-coronavirus-forced-an-abrupt-shift-to-online-classes/

Davies, I. K. (1978). Educational technology: archetypes, paradigms and models. In J. Hartley and I. K. Davies (Eds.), *Contributions to an educational technology, Volume 2*. Kogan Page.

Davis, M. (1999). *Ethics and the university.* Routledge.

Ely, D., & Plomp, T. (1996). *Classic writings on instructional technology.* Libraries Unlimited.

Finn, J. D. (1953). Professionalizing the audio-visual field. *Audio Visual Communication Review, 1*(1), 6-17.

Finn, J. D. (1962). A walk on the altered side. *The Phi Delta Kappan, 44*(1), 29-34.

Gamrat, C, Tiwari, S., and Bekiroglu, S. O. (2022, March 10). INCLUSIVE ADDIE: Initial considerations for DEI pedagogy. *EDUCAUSE Review,* https://er.educause.edu/articles/2022/3/inclusive-addie-initial-considerations-for-dei-pedagogy

Gould, E., & Shierholz, H. (2020, March 19). Not everybody can work from home. *Economic Policy Institute.* Retrieved from https://www.epi.org/blog/black-and-hispanic-workers-are-much-less-likely-to-be-able-to-work-from-home/.

Guersenzvaig, A. (2021). *The goods of design: Professional ethics for designers.* Rowman & Littlefield.

Hodges, C., Moore, S., Lockee, B., Trust, T., and Bond., A. (2020, March 27). The Difference Between Emergency Remote Teaching and Online Learning. *EDUCAUSE Review.* https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Ifenthaler, D. and Tracey, M. (2016). Exploring the relationship of ethics and privacy in learning analytics and design: Implication for the field of educational technology. *Educational Technology Research & Development, 64*(5), 877-880.

Kaufman, R. (1996). Needs assessment: Internal and external. In D. Ely & T. Plomp (Eds.), *Classic writings on instructional technology* (pp. 111-118). Libraries Unlimited, Inc.

Kaufman, R. (2000). *Mega planning: Practical tools for organizational success.* Sage Publications.

Lachheb, A., Abramenka-Lachheb, V., Moore, S., & Gray, C. (2023). The role of design ethics in maintaining study privacy: A call to action to learning designers in higher education.

British Journal of Educational Technology. https://bera-journals.onlinelibrary.wiley.com/doi/10.1111/bjet.13382

Lawson, C., Beer, C., Rossi, D., Moore, T., and Fleming, J. (2016). Identification of "at risk" students using learning analytics: The ethical dilemmas of intervention strategies in a higher education institution. *Educational Technology Research & Development, 64*(5), 957-968.

McNamara, A., Smith, J., & Murphy-Hill, E. (2018, October). Does ACM's code of ethics change ethical decision making in software development? In Proceedings of the 2018 26th ACM joint meeting on European software engineering conference and symposium on the foundations of software engineering (pp. 729-733). https://doi.org/10.1145/3236024.3264833

Moore, S. (2021). The design models we have are not the design models we need. *The Journal of Applied Instructional Design, 10*(4). https://dx.doi.org/10.51869/104/smo

Moore, S. L., & Ellsworth, J. B. (2014). Ethics of educational technology. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (pp. 113–127). Springer.

Moore, S., Hedayati-Mehdiabadi, A., & Law, V. (2024). The change we work: Professional agency and ethics for emerging AI technologies. *TechTrends, 68*, 27–36. https://doi.org/10.1007/s11528-023-00895-1

Moore, S. L. & Tillberg-Webb, H. (2023). *Ethics in educational technology: Reflection, interrogation, and design as a framework for practice.* Routledge / Taylor & Francis.

Moore, S. & Tillberg-Webb, H. (2024). Professional ethics: Design practices for an embedded approach. In R. Rieser and A. Carr-Chelman (Eds.), *Trends and Issues in Instructional Design and Technology, 5th ed.*

Pardo, A. and Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology, 45*(3), 438-450. https://doi.org/10.1111/bjet.12152

Prinsloo, P. and Slade, S. (2013). An evaluation of policy frameworks for addressing ethical considerations in learning analytics. *Proceedings of the Third International Conference on Learning Analytics and Knowledge,* 240-244. https://doi.org/10.1145/2460296.2460344

Rieser, R., Carr-Chelman, A., and Dempsey, J. (2024). *Trends and issues in instructional design and technology, 5th ed.* Routledge.

San Francisco State University Center for Equity and Excellent in Teaching and Learning. (n.d.). *Justice, equity, diversity and including writing PIE.* https://ceetl.sfsu.edu/justice-equity-diversity-and-inclusion-writing-pie

Scholes, V. (2016). The ethics of using learning analytics to categorize students on risk. *Educational Technology Research & Development, 64*(5), 939-955.

Schön, D.A. (1983). *The reflective practitioner: How professionals think in action.* Basic Books.

Slade, S. and Prinsloo, P. (2013). Learning analytics: ethical issues and dilemmas. *American Behavioral Scientist, 57*(10), 1510-1529. https://doi.org/10.1177%2F0002764213479366

Svihla, V. (2020). Problem framing. In J. K. McDonald & R. E. West (Eds.), *Design for learning: Principles, processes, and praxis.* Retrieved from EdTech Books. https://edtechbooks.org/id/problem_framing

University of Rhode Island Office for the Advancement of Teaching and Learning. (n.d.). *Teaching with justice, equity, diversity, and inclusion.* https://web.uri.edu/atl/teaching/deij/

Verbeek, P.-P. (2006). Materializing Morality: Design Ethics and Technological Mediation. In *Science, Technology & Human Values* (Vol. 31, pp. 361–380). https://doi.org/10.1177/0162243905285847

Vogels, E., Perrin, A., Rainie, L., & Anderson, M. (2020, April 30). 53% of Americans say the internet has been essential during the COVID-19 outbreak. *Pew Research Center.* Retrieved from https://www.pewresearch.org/internet/2020/04/30/53-of-americans-say-the-internet-has-been-essential-during-the-covid-19-outbreak/

West, D. Huijser, H., and Heath, D. (2016). Putting an ethical lens on learning analytics. *Educational Technology Research & Development, 64*(5), 903-922.

Whitbeck, C. (1996). Ethics as design: Doing justice to moral problems. *The Hastings Center Report, 26*(3), 9-16.

Willis, J.E., Slade, S., and Prinsloo, P. (2016). Ethical oversight of student data in learning analytics: A typology derived from a cross-continental, cross-institutional perspective. *Educational Technology Research & Development, 64*(5), 881-901.

Yeaman, A. R. J. (2006). Scenarios and principles. *TechTrends, 50*(2), 10-11.

Yeaman, A. R. J. (2013). Annotated scenarios. *TechTrends, 57*(4), 14-16.

Yeaman, A. R. J. (2015). Scenarios for learning about AECT's Professional Ethics. https://www.aect.org/docs/Scenario_Annotations_2015.pdf

Yeaman, A., Koetting, R., & Nichols, R. (1994). Critical theory, cultural analysis, and the ethics of educational technology as social responsibility. *Educational Technology, 34*(2), 5-13.

Integrating Ethics into Design and Decision-Making Processes and Practices

Instructional Designers as Ethical Mediators

Gray, C. M.

Ethical inscription | Ethics | Mediation | Values

Instructional designers have been instrumental in shaping learning experiences for almost a century —contributing to perceptions of what instructional experiences should be considered valuable, worthwhile, and rigorous. However, instructional theories and models of instructional design practice have rarely considered the ethical role of the designer in creating equitable and inclusive futures. In this chapter, I use two vignettes of instructional design work framed by facial recognition technologies to locate ethical tensions between designers and learners, identifying opportunities to leverage the mediating role of the designer. I describe potential ways forward for researchers, educators, and students that reposition ethics at the core of the discipline.

Instructional designers have been at the forefront of the scale-up of learning experiences of all kinds over the last century—transitioning our societies from highly local instructional practices to ones that have a shared connection to instructional and learning theories that can be practiced at scale. However, in what has been framed as a rush to "scientize" the discipline of instructional design (Smith & Boling, 2009), some of the core components of what it means to re-shape the world through design have potentially been lost. Chief among these components is perhaps the responsibility of the designer themself in creating new futures, shaping worlds and lives, and sustaining or confronting structural norms that more often disempower or exclude rather than empower and emancipate. Indeed, the models that dominate the field of instructional design rarely include references to the moral and ethical components that are at the center of the experienced pedagogy, and this lack of focus has—for decades—kept scholars and practitioners in our field from questioning and negotiating ethical tensions in the design of learning experiences.

In this chapter, I will confront this historic lack of attention to ethics in instructional design by focusing on the role of the designer themself in negotiating competing values and norms as a key part of engaging in design work. I will first provide some brief background to describe how the designer's role intersects with a broader view of design as intentional change and worldbuilding. I will then use two vignettes that describe the intersection of instructional design and a specific category of technologies—facial recognition—to identify relevant values and ethical tensions that instructional designers must recognize and confront. I conclude with some ideas of how the field of instructional design might relocate ethics to its core, impacting the theory and practice of instructional designers in ways that not only acknowledge but also explicitly leverage the making of more ethical and inclusive futures.

Framing the Ethical Landscape of Design Practice

Design is an ethical act whereby we change "existing situations into preferred ones" (Simon, 1996). However, whose world is being shaped and what constitutes a preferred state is contested and value-laden (Willis, 2006). Even while education and instruction have been framed as a moral enterprise (e.g., Durkheim, 2012; Nucci, 2006) with the learner's uptake of norms and values as part of their cognitive schema taken as an inherent part of educational praxis, the field of instructional design and technology has unevenly addressed—or even acknowledged—the role of ethics in the design of instructional experiences (see Gray & Boling, 2016; Yeaman et al., 1994 as a synthesis of the nascent interest in ethics in ID across multiple decades).

In my research spanning more than a decade, I have sought to describe how values and matters of ethical concern are manifest in design activity—including work across the spectrum of instructional design, learning experience design, human-computer interaction design, and beyond (Boling et al., 2020; Chivukula et al., 2020; Gray & Boling, 2016; Gray & Chivukula, 2019; Gray et al., 2015). Through this work, my co-authors and I have revealed the subjective and contingent judgments that guide a designer's practice (Gray et al., 2015), the

mediating role of the designer in identifying and responding to ethical design complexity (Gray & Chivukula, 2019), and the practices of designers that often reinforce an imbalance of power between stakeholders and end users through practices such as deceptive design, "asshole design," or the use of dark patterns (Gray, Chivukula, et al., 2020, 2021; Gray et al., 2018). These studies have revealed what has been known by designers since the dawn of the Industrial Revolution: designers are powerful agents that can use their skills to reshape the world, reinforcing structural inequities, pandering to humanity's worst excesses, or contributing to emancipatory and socially just design practices (cf., Costanza-Chock, 2020; Papanek, 1971).

While much previous research has focused on situating ethical engagement in relation to common paradigms of ethics (e.g., consequentialist, virtue, deontological)—for instance, through codes of ethics (Adams et al., 2001; Buwert, 2018) or methodologies that are grounded in moral philosophy (e.g., Flanagan & Nissenbaum, 2014; Friedman & Hendry, 2019), in my previous work, I have sought to describe how designers might frame ethics as a core part of their everyday ways of being and acting in service to client needs in a socially responsible manner—which others have described as "everyday ethics" (cf., Halberstam, 1993), building on the pragmatist tradition of ethical engagement that prioritizes both ethical awareness and attention to intentionally reshaping society in accordance with one's values (Dixon, 2020; Steen, 2015).

Doing "Ethics by Other Means"

According to philosophical engagement by Verbeek (2006) and underscored by empirical work by Shilton (2013, 2018), designers of all sorts engage in ethical reasoning and pragmatic action. However, designers do so in ways that are characteristically different from moral philosophers or those only seeking to theorize what should or ought to be. Instead, designers (re)shape the world through judgments that are always already value-laden—or what Verbeek (2006) describes as "doing ethics by other means"—whether designers are aware of this ethical armature embedded within their work or not.

What does this engagement look like when a designer is ethically aware? And what might a design situation or set of design outcomes look like when awareness and sensitivity to ethical impact are lacking? I will present two brief vignettes of recent contexts of instructional design work, focusing on the integration of specific emerging technologies to illustrate the inscribed values present in designed outcomes and identify opportunities for increasing a designer's ethical awareness and ability to act. Both vignettes focus on one specific type of technology deployed in the service of learning experiences to allow comparison—namely, the use of facial recognition and computer vision as a surveillance technology. Comparable technology-driven application contexts for learning (e.g., social learning via web-based interactions, engagement through mixed reality, or learning analytics-focused approaches, just to name a few) could be evaluated similarly using this same approach.

Surveilling Affect and Attention in the Residential Classroom

First, I will describe a vignette from prior to the COVID-19 pandemic, which leveraged advances in computer vision. With the rise of capacity to perform facial recognition in real-time, this technology has also been applied in educational contexts. More recently, the use of facial recognition and computer vision techniques has evolved beyond mere recognition (which has applications for educational settings in attendance tracking, for instance; Mothwa et al., 2018) to attempt to evaluate student attitudes, emotions, or attention (Barrett et al., 2019; Zaletelj & Košir, 2017).

Early techniques to detect learner characteristics took place in physical learning environments, using detection techniques that included video cameras and, in some cases, Kinect sensors. Facial recognition and evaluation models have been proposed using these data sources to classify learner behaviors about engagement, attention, and emotion. For example, one such proposed system published before the pandemic, known as EmotionCues, used "[a]naly[sis of] students' emotions from classroom videos [to] help both teachers and parents quickly know the engagement of students in class" (Zeng et al., 2021). These types of detection and analysis techniques have continued to be honed through the pandemic, leading to recent plans for integration into a commercial product called Class offered by Intel and Classroom Technologies[1] that will "capture[] images of students' faces with a computer camera and computer vision technology [on Zoom] and combine[] it with contextual information about what a student is working on at that moment to assess a student's state of understanding" (Kaye, 2022).

What values were in tension when considering the design and deployment of this system? First, let us consider how these beliefs might emerge in relation to an instructional designer or instructor's goals of evaluating or characterizing learner attention or understanding:

- Visible learner attention is critical to the efficacy of learning experiences
- Learner attention can be rigorously tracked and evaluated through facial recognition technologies
- Tracking the attention of individual learners in large groups is important to provide customized learning or tutoring
- Visible emotions can indicate a learner's level of understanding (as a proxy for learning)
- Even if emotional or attention tracking is knowingly flawed, it is better than nothing

Second, we can consider beliefs from the perspective of a learner whose attention or emotions may be continuously tracked by such technologies, with or without their knowledge:

- I want to be valued as an individual.
- I want to have control over how I am perceived by others.
- I want to be aware of what data is being collected about me and how these data might be used to inform my learning experience.
- I want to be able to say no to being surveilled as part of my learning experience.

- I am okay with being tracked by video, but I want to know how the instructor uses these data or if they relate to my participation grade.

Some assumptions by the instructional designer or educator are rooted in learning theory, where the learner's attention is a critical pre-condition for them to engage in a learning experience and/or construct their knowledge. For instance, the ability of an instructor to visually recognize when students are less attentive might be a trigger to use a different pedagogical strategy (perhaps planned by an instructional designer) that is more engaging. However, some other assumptions relate to what is technically possible or how technical possibility might relate to other aspects of the learning experience. For instance, one could easily move from the belief that tracking the attention of individual learners is important to assume that any technology that could scale this assessment from dozens of learners to hundreds might bring pedagogical value. In parallel, a belief that technologies can accurately detect human emotions, attention, or other proxies for "understanding" or "learning" might lead an instructional designer to specify these technologies without anticipating instances where these technologies fail or otherwise lead to inaccurate results. For instance, Barrett et al. (2019) have previously identified numerous assumptions built into flawed models of emotion, including a lack of consideration of context, individual personality, and cultural factors. The values of the designer and learner come into tension around the technological capacity of tracking and the pragmatics of using these technologies to inform the learning experience. The learner may want to be able to express their choice not to be surveilled, even while they may have little or no agency to make this choice in their learning environment.[2] From a more pragmatic perspective, the instructional designer or instructor may recognize that the attention scores produced by the machine learning model are flawed but reason that these scores are "better than nothing." There are numerous values in tension in this example—some which relate to technological capacity or efficacy, others that relate to learner autonomy versus instructor support, and still others that relate to the surveillance "end state" of learning technologies, which some scholars have openly criticized (Andrejevic & Selwyn, 2020).

This vignette raises several questions about the roles and decision-making capacity of multiple stakeholders in relation to emerging technologies and the kinds of evidence that lead to certain decisions being made. Should a student have recourse if their "attention" is deemed lacking, but this lower attention score relates to different cultural background, neuroatypical or disability status, or other failures of the tracking technology? How accurate should technologies be for them to be allowed in the classroom? How much control should learners be able to assert over which technologies are used, what data is allowed to be collected about them, and how this data is used? How transparent should the instructor or designers' use of data extracted through surveillance technologies to inform grades or other decisions be to the learner?

Surveillance in the Home

In the wake of the COVID-19 pandemic, educators sought to pivot their instructional practices to address the realities of "pandemic pedagogy." Residential instruction, in particular, moved into "emergency remote teaching" mode (Hodges et al., 2020), and instructors quickly sought to identify assessment alternatives that would translate existing

proctored testing methods into the student's home. Of course, proctored tests at a distance were nothing new—but the scale and speed at which this shift took place seldom addressed issues of equity, student autonomy, and the translation of assessment context without taking into place other assumptions of how these inscribed values would impact the learner's experience. Articles in the popular press quickly decried this software as intrusive, and students' experience of the kinds of behaviors flagged by common software such as Proctorio and Examity that used face- and gaze-detection precipitated outrage.

What resulted could have been predicted based on prior literature on privacy and education (e.g., Arpaci et al., 2015). Students enrolled in higher learning institutions worldwide were required to download and install highly intrusive software on their personal devices. Software typically required access to a microphone and webcam. Many proctoring "solutions" also required the student to verify that the room was clear of other people and flagged instances where other voices were audible. One anecdote of this tracking at its worst was reported in The Washington Post:

> *"'A STUDENT IN 6 MINUTES HAD 776 HEAD AND EYE MOVEMENTS,' [the instructor] wrote [to a student], adding later, 'I would hate to have to write you up.'"*
>
> *[. . .]*
>
> *One student replied in a group chat with their peers: "How the hell are we [supposed] to control our eyes" (Harwell, 2020).*

This tracking occurred during a pandemic where families and friends were frequently locked down in close quarters. Many students did not have adequate access to physical privacy, others were ill while attending class remotely, and still, others were experiencing high levels of anxiety as the world seemingly was burning down around them in the biggest health crisis in a century. Adding in additional realities of the pandemic, such as the need to quarantine or isolate, rapidly shifting public health protocols, and uneven transition to remote learning pedagogies, the use of invasive proctoring software was a recipe for disaster.

While it is easy to view the particular socio-cultural and socio-technical tensions brought about by the pandemic as difficult yet peculiar—issues that could not have been foreseen or mitigated—the reality is somewhat different. Even before the pandemic, some learners did not have access to the types of technology and privacy that were assumed by the proctoring software (Gonzales et al., 2020). Characteristics of assessment that were unquestioningly supported by proctoring software providers, highlighting specific forms of rigor and validity in specific controlled assessment environments, resulted in inequitable impacts on students learning in the least hospitable environments. These socio-cultural impacts were felt most acutely by those who were intersectionally disadvantaged and disempowered: those living in shared living spaces with many family members and friends, those experiencing homelessness and living in their cars or other ad hoc environs, and those lacking up-to-date digital devices.

What values were in tension[3]? Values that are foregrounded in the design of instruction (or, in this case, assessment) are rooted in the beliefs one has about their discipline, their pedagogy, and the nature of student experiences that are deemed most beneficial. First, let

us consider how these beliefs might emerge concerning the idea of testing as an assessment method[4]:

- Testing is the best mode of assessment for certain types of content knowledge.
- Testing is the most practical means of assessing student mastery of content knowledge in large classrooms.
- Testing is flawed, but there is no time to pivot to other assessment forms.
- Testing is the only common assessment method in my discipline.
- Students' inability to "cheat" or use outside sources of knowledge is a key criterion for assessment rigor and validity.
- Evaluation of external signals (e.g., audio, video, gaze) can be used to detect common drivers for cheating.

These beliefs point towards values that focus primarily on the pragmatics of instruction, focusing on issues of scale, consistency, and/or tradition. Second, we can consider beliefs from the perspective of a pandemic learner:

- I am just trying to survive
- I want to feel valued as a person
- I want to be judged by what I can do in an authentic setting

These beliefs point towards values such as authenticity, autonomy, or transparency. The values that were inscribed into the initial design decisions surrounding test-based assessment were potentially problematic—focusing on instructor-centric concerns rather than the student experience or the permanence of learning outcomes—but the intersectional harms of these decisions were potentially minimized due to the public nature of the residential classroom where access to technology devices was more readily ensured. However, when these public assumptions, including the minimization of individual student privacy, shifted and became translated into the student's home, bedroom, or other living environment, these inscribed values became evidently and transparently inequitable. Should a piece of software or proctor have the right to know the student's living situation? Should students not only submit themselves to mandated surveillance but also pay for the privilege of being surveilled (in many cases)? What types of privacy should the student have to give up to be able to participate in mandatory forms of assessment? What boundaries can or should exist in the liminal space between the instructor, instructional environment, and student?

Discussion

While I have provided two examples of explicit surveillance in this chapter to provide a point of focus, many other tactics commonly used by instructional designers to track and evaluate learner progress could also be viewed through a more critical lens. When does the use of learning analytics to track clickstream data at a profoundly detailed level in an LMS, app, or learning module shift from a primary purpose of providing value to the learner to the collection and modeling of data because the stakeholder can? How transparent are these

data collection and use methods, and how much control does the learner have over how their data are collected and used? What forms of privacy should learners be guaranteed, and how would they know they had a choice in how their data were collected and used as part of their educational experience? How might deceptive techniques such as dark patterns be used to steer learner behavior and interactions with educational materials? And when might manipulative practices be used to overtly mandate surveillance in contexts where learners have no other recourse—consistent with prior definitions of "asshole designer properties" (Gray, Chivukula, et al., 2020)?

Learning technologies and other outcomes of instructional design practices are representative of few contexts where users do not have to consent meaningfully—where their engagement with instructors or mandated learning modules is already power-laden and where the learner's voice can often be avoided or overtly ignored. What justice-oriented design practices (Costanza-Chock, 2020; Svihla et al., 2022) might be used to reassert learner autonomy, encouraging consideration of the potential harms and future abuses of educational technologies? How might the field of instructional design and technology consider—at its very core—issues of ethical impact? As Moore (2021) has recently written, the models that are commonly referred to as the theoretical foundation of our field do not adequately explain or support the everyday practices of instructional designers; further, these models rarely address matters of ethical concern, much less making these concerns central to the practice of design. In this sense, our field is far behind others. Papanek (1971) called for the centrality of ethics in industrial design in the 1970s, citing the damage being done in the name of disposable consumer culture. Garland (1964) decried the abuses of graphic designers when marketing to consumers in the 1960s, which Milton Glaser marked out through Dante-esque steps that a designer could consider along a "Road to Hell."[5] Methodologies such as Value-Sensitive Design (Friedman & Hendry, 2019) and Values at Play (Flanagan & Nissenbaum, 2014) have also shaped fields adjacent to instructional design for decades. So, what do we need to do as instructional design scholars and practitioners to "catch up" and re-locate ethics at the center of our practice?

I will describe two foundational elements of ethics-focused practice that instructional design educators, students, and practitioners should consider: 1) identifying values and matters of ethical concern as always already existing as a part of instructional design work and 2) harnessing and languaging ethics to center design conversations on ethical concerns with attention to opportunities for action.

Values are Mediated by the Designer

The issues foregrounded through an analysis of surveillance technologies in instructional design allow initial access to the values implicit in all learning environments. Critical pedagogy scholars have described some of these facets of the learning experience as the "hidden curriculum" (Gray, Parsons, et al., 2020; Snyder, 1970; Volpi, 2020)—describing things that are learned even if they are not explicitly taught. Thus, reconstructive techniques such as those used in the vignettes above can be used as one entry point toward understanding the broader structural and socio-cultural implications of instructional design decisions at the broadest scales.

However, value inscription and ethical impact also shape the most mundane instructional design decisions. These tensions relate to what Vickers (1984) calls one's appreciative system, which Schön (Boling et al., 2020) used to describe how designers frame the design situation, consider solutions, and then use the underlying appreciative assumptions of those solutions to iterate and move the design process forward. This reliance upon an appreciative system—that incorporates a set and hierarchy of values and a particular point of view—is an inescapable part of design work that can only be taken on by a designer who is acting based on their moral judgments and design character (Boling et al., 2020). To address this complex and ethically nuanced space, the designer must use their judgment to understand both the inherent complexity of the design context (what Stolterman, 2008 refers to as "design complexity") and the ethical character of that space that makes some decisions more preferable to certain stakeholders under certain conditions (what Gray & Chivukula, 2019 refer to as "ethical design complexity"). Ethical design complexity foregrounds both the values that are "in play" as part of the design context and the role of the designer in manipulating these values as a core part of the design process—"complex and choreographed arrangements of ethical considerations that the designer continuously mediates through the lens of their organization, individual practices, and ethical frameworks" (Gray & Chivukula, 2019, p. 9). Instructional designers must be equipped to recognize this inherent ethical design complexity, and rather than scientize or abstract this ethical responsibility, embrace its contingency and subjectivity on behalf of the learners and society they wish to support.

Values (and Methods That Engage Values) Should Be a Key Element of Doing and Talking About Design Work

Even designers with the best and most altruistic intentions can design outcomes that are directly harmful to learners or produce societal impacts that reproduce inequities [6]. As an entry point to considering these harms, designers should consider using value-sensitive methodologies such as those proposed by Friedman and Hendry (2019) or broader and more flexible use of design methods that engage designers in considering ethical impact across various dimensions. My colleagues and I have collected and organized a set of ethics-focused methods (https://everydayethics.uxp2.com/methods), and further details about how we created this collection are available in a companion research article (Chivukula et al., 2021). As part of our collection and analysis process, we have identified multiple "intentions" that could drive more ethically centered practice, including I want to have additional information about my users, I want to identify appropriate values to drive my design work; I want to figure out how to break my design work; I want to evaluate my design outcomes; I want to apply specific values in my design work; I want to align my team in addressing difficult decisions; and I want to better understand my responsibility as a designer. Many of these intentions could be used to scaffold similar conversations to those raised in the vignettes above that relate to the ethical character of key design decisions, expectations of social impact, or identification of direct or indirect harms to learners or other stakeholders.

We have considered the case of the careful designer who is concerned about societal impact and might find substantial value in enhancing their practices through ethically-centered design methods. But designers—knowingly or unwittingly—can also inscribe harmful practices into their designed outcomes that take advantage of knowledge of human behavior. These tactics are commonly known as dark patterns—design strategies that provide more value to the stakeholder or shareholder than the user (Gray, Chen et al., 2021; Gray et al., 2018; Gunawan et al., 2021; Mathur et al., 2021). More hostile and transparent forms of manipulation or coercion have also been captured under the label of asshole designer strategies (Gray, Chivukula et al., 2020), which explicitly diminish user autonomy. As framed previously in the two vignettes that described the use of facial recognition to augment learning experiences, some harms can be directly traced back to beliefs about instruction or assessment that may be inequitable or otherwise ethically problematic. However, other deceptive tactics might be less easily identified initially, steering or nudging the learner but perhaps not forcing, manipulating, or coercing them. These learner and designer agency imbalances are an ideal space for further investigation by instructional design scholars. When is it acceptable for an instructional designer to use sneaking, nudging, nagging, or other strategies to subtly encourage learners to do things they might not otherwise do?[7] How is the designer's knowledge of learning conditions, learner profiles, and human psychology used to create more transparent spaces where autonomy and emancipation emerge as primary inscribed values? What commitments do instructional designers have to negotiate the complex tensions among different stakeholders, and what values should be central to the praxis of instructional design?

Conclusion

In this chapter, I have described two vignettes that reveal ethical tensions in the design of instructional experiences, identifying opportunities for competing sets of values to be articulated and used to make appropriate and ethically-centered design decisions. Leveraging these vignettes, I posit that instructional design educators, students, and practitioners should attend to the value-laden nature of design work by increasing their awareness of how the actions of a designer always already mediate ethics as a central part of the design context. Since this is the case, designers should attend to values as a key means of doing and discussing their design work.

References

Adams, J. S., Tashchian, A., & Shore, T. H. (2001). Codes of ethics as signals for ethical behavior. *Journal of Business Ethics, 29*(3), 199–211. https://doi.org/10.1023/A:1026576421399

Ames, M. G. (2019). *The charisma machine: The life, death, and legacy of one laptop per child*. MIT Press. https://play.google.com/store/books/details?id=v4y5DwAAQBAJ

Andrejevic, M., & Selwyn, N. (2020). Facial recognition technology in schools: critical questions and concerns. *Learning, Media and Technology, 45*(2), 115–128. https://doi.org/10.1080/17439884.2020.1686014

Arpaci, I., Kilicer, K., & Bardakci, S. (2015). Effects of security and privacy concerns on educational use of cloud services. *Computers in Human Behavior, 45*, 93–98. https://doi.org/10.1016/j.chb.2014.11.075

Barrett, L. F., Adolphs, R., Marsella, S., Martinez, A. M., & Pollak, S. D. (2019). Emotional expressions reconsidered: Challenges to inferring emotion from human facial Movements. *Psychological Science in the Public Interest, 20*(1), 1–68. https://doi.org/10.1177/1529100619832930

Boling, E., Gray, C. M., & Smith, K. M. (2020, August). Educating for design character in higher education: Challenges in studio pedagogy. Proceedings of the *Design Research Society*. https://doi.org/10.21606/drs.2020.120

Buwert, P. (2018, June). Examining the professional codes of design organisations. Proceedings of the *Design Research Society*. https://doi.org/10.21606/dma.2017.493

Castelli, F. R., & Sarvary, M. A. (2021). Why students do not turn on their video cameras during online classes and an equitable and inclusive plan to encourage them to do so. *Ecology and Evolution, 11*(8), 3565–3576. https://doi.org/10.1002/ece3.7123

Chivukula, S. S., Li, Z., Pivonka, A. C., Chen, J., & Gray, C. M. (2021). Surveying the Landscape of Ethics-Focused Design Methods. *arXiv*. http://arxiv.org/abs/2102.08909

Chivukula, S. S., Watkins, C. R., Manocha, R., Chen, J., & Gray, C. M. (2020). Dimensions of UX practice that shape ethical awareness. Proceedings of the *2020 CHI Conference on Human Factors in Computing Systems*, 1–13. https://doi.org/10.1145/3313831.3376459

Costanza-Chock, S. (2020). *Design justice: Community-led practices to build the worlds we need*. MIT Press. https://play.google.com/store/books/details?id=h4LPDwAAQBAJ

Dixon, B. S. (2020). *Dewey and design*. Springer International Publishing. https://doi.org/10.1007/978-3-030-47471-3

Durkheim, É. (2012). *Moral education*. Courier Corporation. https://play.google.com/store/books/details?id=R-2nCgAAQBAJ

Flanagan, M., & Nissenbaum, H. (2014). *Values at play in digital games*. MIT Press. https://market.android.com/details?id=book-iIYRBAAAQBAJ

Friedman, B., & Hendry, D. G. (2019). *Value sensitive design: Shaping technology with moral imagination.* MIT Press. https://market.android.com/details?id=book-C4FruwEACAAJ

Friedman, B., & Kahn, P. H., Jr. (2003). Human values, ethics, and design. In J. A. Jacko & A. Sears (Eds.), *The human-computer interaction handbook* (pp. 1223–1248). Lawrence

Erlbaum Associates. https://content.taylorfrancis.com/books/e/download?dac=C2009-0-12021-5&isbn=9781410615862&doi=10.1201/9781410615862-81&format=pdf

Garland, K. (1964). First things first manifesto. Design is history. http://www.designishistory.com/1960/first-things-first/

Gonzales, A. L., McCrory Calarco, J., & Lynch, T. (2020). Technology problems and student achievement gaps: A validation and extension of the technology maintenance construct. *Communication Research, 47*(5), 750–770. https://doi.org/10.1177/0093650218796366

Gray, C. M., & Boling, E. (2016). Inscribing ethics and values in designs for learning: a problematic. *Educational Technology Research and Development, 64*(5), 969–1001. https://doi.org/10.1007/s11423-016-9478-x

Gray, C. M., Chen, J., Chivukula, S. S., & Qu, L. (2021). End user accounts of dark patterns as felt manipulation. Proceedings of the *ACM on Human-Computer Interaction,* 5. https://doi.org/10.1145/3479516

Gray, C. M., & Chivukula, S. S. (2019). Ethical mediation in UX practice. Proceedings of the *2019 CHI Conference on Human Factors in Computing Systems*, 1–11. https://doi.org/10.1145/3290605.3300408

Gray, C. M., Chivukula, S. S., & Lee, A. (2020). What kind of work do "asshole designers" create? Describing properties of ethical concern on Reddit. Proceedings of the *2020 ACM Designing Interactive Systems Conference*, 61–73. https://doi.org/10.1145/3357236.3395486

Gray, C. M., Chivukula, S. S., Melkey, K., & Manocha, R. (2021). Understanding "dark" design roles in computing education. Proceedings of the *17th ACM Conference on International Computing Education Research*. https://doi.org/10.1145/3446871.3469754

Gray, C. M., Dagli, C., Demiral-Uzan, M., Ergulec, F., Tan, V., Altuwaijri, A. A., Gyabak, K., Hilligoss, M., Kizilboga, R., Tomita, K., & Boling, E. (2015). Judgment and instructional design: how ID practitioners work in practice. Performance Improvement Quarterly, 28(3), 25–49. https://doi.org/10.1002/piq.21198

Gray, C. M., Kou, Y., Battles, B., Hoggatt, J., & Toombs, A. L. (2018). The dark (patterns) side of UX design. Proceedings of the *2018 CHI Conference on Human Factors in Computing Systems*, 534:1–534:14. https://doi.org/10.1145/3173574.3174108

Gray, C. M., Parsons, P., & Toombs, A. L. (2020). Building a holistic design identity through integrated studio education. In B. Hokanson, G. Clinton, A. A. Tawfik, A. Grincewicz, & M. Schmidt (Eds.), *Educational technology beyond content: A new focus for learning* (pp. 43–55). Springer International Publishing. https://doi.org/10.1007/978-3-030-37254-5_4

Gunawan, J., Pradeep, A., Choffnes, D., Hartzog, W., & Wilson, C. (2021). A comparative study of dark patterns across web and mobile modalities. Proceedings of the *ACM on Human-Computer Interaction, 5(CSCW2)*, 1–29. https://doi.org/10.1145/3479521

Halberstam, J. (1993). *Everyday ethics: Inspired solutions to real-life dilemmas*. Penguin Books.

Harwell, D. (2020, November 12). *Cheating-detection companies made millions during the pandemic. Now students are fighting back*. The Washington Post. https://www.washingtonpost.com/technology/2020/11/12/test-monitoring-student-revolt/

Hodges, C., Moore, S., Lockee, B., Trust, T., Bond, A., & Others. (2020). The difference between emergency remote teaching and online learning. *Educause Review, 27*, 1–12.

Kaye, K. (2022, April 17). Intel thinks its AI knows what students think and feel in class. *Protocol*. https://www.protocol.com/enterprise/emotion-ai-school-intel-edutech

Mathur, A., Kshirsagar, M., & Mayer, J. (2021). What makes a dark pattern... dark? Design attributes, normative considerations, and measurement methods. Proceedings of the *2021 CHI Conference on Human Factors in Computing Systems*, 1–18. https://doi.org/10.1145/3411764.3445610

Moore, S. (2021). The design models we have are not the design models we need. *Journal of Applied Instructional Design, 10*(4). https://edtechbooks.org/jaid_10_4/the_design_models_we

Mothwa, L., Tapamo, J.-R., & Mapati, T. (2018). Conceptual model of the Smart Attendance Monitoring System using computer vision. *2018 14th International Conference on Signal-Image Technology Internet-Based Systems (SITIS)*, 229–234. https://doi.org/10.1109/SITIS.2018.00042

Nucci, L. (2006). *Education for moral development. In Handbook of moral development* (pp. 675–700). Psychology Press. https://www.taylorfrancis.com/chapters/edit/10.4324/9781410615336-36/education-moral-development-larry-nucci

Papanek, V. J. (1971). *Design for the real world; human ecology and social change*. Bantam Books.

Schön, D. A. (1984). Problems, frames and perspectives on designing. *Design Studies, 5*(3), 132–136. https://doi.org/10.1016/0142-694X(84)90002-4

Shilton, K. (2013). Values levers: Building ethics into design. *Science, Technology & Human Values, 38*(3), 374–397. https://doi.org/10.1177/0162243912436985

Shilton, K. (2018). Engaging values despite neutrality: Challenges and approaches to values reflection during the design of internet infrastructure. *Science, Technology & Human Values, 43*(2). https://doi.org/10.1177/0162243917714869

Simon, H. A. (1996). *The sciences of the artificial*. MIT Press.

Smith, K. M., & Boling, E. (2009). What do we make of design? Design as a concept in educational technology. *Educational Technology Research and Development, 49*(4), 3–17.

Snyder, B. R. (1970). *The hidden curriculum*. MIT Press. https://philpapers.org/rec/SNYTHC

Steen, M. (2015). Upon opening the black box and finding it full: Exploring the ethics in design practices. *Science, Technology & Human Values, 40*(3), 389–420. https://doi.org/10.1177/0162243914547645

Stolterman, E. (2008). The nature of design practice and implications for interaction design research. *International Journal of Design, 2*(1), 55–65. https://doi.org/10.1016/j.phymed.2007.09.005

Svihla, V., Chen, Y., & Kang, S. "pil." (2022). A funds of knowledge approach to developing engineering students' design problem framing skills. *Journal of Engineering Education*. https://doi.org/10.1002/jee.20445

Verbeek, P.-P. (2006). Materializing morality: Design ethics and technological mediation. In *Science, technology & human values* (Vol. 31, pp. 361–380). https://doi.org/10.1177/0162243905285847

Vickers, S. G. (1984). Judgment. In *The Vickers papers* (pp. 230–245). Harper & Row.

Volpi, C. (2020). *Unveil awareness: A design education tool for revealing the hidden curriculum* [Master's thesis, Delft University of Technology]. https://repository.tudelft.nl/islandora/object/uuid:2bfc57e9-9bfb-4440-9cfe-daaba5b219c9

Warschauer, M., & Ames, M. (2010). Can one laptop per child save the world's poor? *Journal of International Affairs, 64*(1), 33–51. http://www.jstor.org/stable/24385184

Willis, A.-M. (2006). Ontological designing. *Design Philosophy Papers, 4*(2), 69–92. https://doi.org/10.2752/144871306X13966268131514

Yeaman, A. R. J., Koetting, J. R., & Nichols, R. G. (1994). Critical Theory, Cultural Analysis, and the Ethics of Educational Technology as Social Responsibility. *Educational Technology, 34*(2), 5–13. https://www.jstor.org/stable/44428138

Zaletelj, J., & Košir, A. (2017). Predicting students' attention in the classroom from Kinect facial and body features. *EURASIP Journal on Image and Video Processing, 2017*(1), 1–12. https://doi.org/10.1186/s13640-017-0228-8

Zeng, H., Shu, X., Wang, Y., Wang, Y., Zhang, L., Pong, T.-C., & Qu, H. (2021). EmotionCues: Emotion-oriented visual summarization of classroom videos. *IEEE Transactions on Visualization and Computer Graphics, 27*(7), 3168–3181. https://doi.org/10.1109/TVCG.2019.2963659

Footnotes

[1] https://www.class.com/

[2] For instance, see equity issues that emerged in relation to “camera on” policies during the pandemic that left some learners with limited ability to express their privacy preferences (Castelli & Sarvary, 2021)

[3] See (Friedman & Kahn, 2003) for a further discussion of human values, including how values become part of the fabric of designer interactions through embodied, exogeneous, and interactional positions.

[4] Many of these beliefs were discussed and espoused by educators throughout the pandemic on the Facebook group “Pandemic Pedagogy,” which at the time of writing has over 32,000 members.

[5] Glaser’s original “road to hell” steps along with contemporary interpretations for digital product designers are available at https://dropbox.design/article/the-new-12-steps-on-the-road-to-product-design-hell.

[6] As a classic example in the context of educational technologies, consider the problematic legacy of the “One Laptop Per Child” initiative; (Ames, 2019; Warschauer & Ames, 2010).

[7] See (Gray, Chivukula, et al., 2021) for a description of deceptive roles that designers can take on when attempting to resolve tensions between user agency and design goals.

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In Support of Ethical Instructional Design

Translation and use of the ethical choices with educational technology instructional design tool

Warren, S. , Beck, D. , & McGuffin, K.

Choices
Decision-making
Educational Technology
Ethical Thinking
Evaluation
Framework
Instructional Design

As technology solutions continue to grow in complexity, the choices facing those who wish to use them both effectively and ethically continue to grow more complex. The purpose of this chapter is to present the Ethical Choices with Educational Technology framework translated from K-12 setting use to instructional design practices in any setting (ECET ID). Two competing instructional design tool resources are compared and scored using the ECET ID framework to illustrate how it can help a designer choose a multimedia production tool that a.) meets the needs of their

idea, b.) is feasible to use by their clients in the time available, and c.) is deemed to have the best ethical outcomes from design through use.

Introduction

The goal of this chapter is to explain how the Ethical Choices with Educational Technology (ECET) framework (Beck & Warren, 2020) can be employed to guide an ethical decision-making process for instructional designers tasked with developing new tools for educators. This chapter will review the need for ethical thinking with educational technologies in K-12 and higher education environments (Spector, 2016). Then, we will explain the development and current components of the validated ECET framework available to instructors to guide their ethical decision-making process regarding new learning technology adoption. Using components of the instructor-focused ECET framework, we will then offer a practical guide for instructional designers for step-by-step use, followed by question prompts that support making ethical decisions about their overall design, individual technology decisions, and assessment methods. The primary goal of this piece is to adapt the thought process of the ECET framework into usable guidance for designers who want to perform their work ethically, with a core focus on ensuring the safety of the target users.

Ethics with Educational Technology

In this section, we examine big-picture questions about thinking ethically about the adoption (Palm & Hansson, 2006), learning use, and assessment aspects of educational technologies as a framing for the remaining sections in the background. Much of the literature covered here will be historical and often tied to other frameworks that inspired the one here (Schenk & Williamson, 2005). This will include issues that commonly arise with the use of or design of instructional systems, tools, digital curricula (Lucey & Grant, 2008), analytics (Pardo & Siemens, 2014), or created supports for education that are technology intensive (Warren & Lin, 2012; Lin, 2007).

In the past, ethics was not a focus of instructional technology design (Gray & Boling, 2016; Himelboim & Limor, 2008). The field of education has historically addressed ethics in terms of privacy and security, informed consent, data anonymity, authorship, and ownership (Chou & Chen, 2016; Papamitsiou et al., 2021; Klein & Jun, 2014). More recently, Steele et al. (2020) and Tzimas and Demetriadis (2021) expanded the discussion of ethical issues facing instructional designers, including physical, social, psychological, and moral concerns with immersive technologies and learning analytics. However, although these publications focus on relevant issues, they do not develop their findings into an easily usable form by instructional designers. On the other hand, more dated research provided by Warren and Lin (2014) provided specific questions that designers should consider as they design and

develop educational technology interventions. Yet, their presentation lacks the benefit of integrating newer research on ethical issues facing teachers integrating technology into their classrooms (Warren & Beck, under review). The latter authored the Ethical Choices in Educational Technology framework (ECET) as a tool to help teachers make ethical decisions. This tool covered four sections: idea, feasibility, ethics, and evaluation. Unfortunately, no such tool currently exists for instructional designers. As a result, this paper attempts to integrate the approaches by Warren & Beck (under review) and Warren and Lin (2014) to create Ethical Choices for Educational Technology for Instructional Designers (ECET ID).

ECET Framework

This section explains the reasoning behind creating the ECET ethics question frameworks designed to help instructors think through their prospective technology ideas before implementing possible problematic technologies in classrooms. These frameworks include examinations not only of the ideas but also of feasibility given practical constraints in their local settings, as well as ethical questions about the tools they intend to employ, vendor business considerations tied to the creation and use of those tools, as well as their own classroom or training implementation practices. By allowing instructors to consider these questions before or during a planning process, a goal is that users can avoid negative ethical and practical outcomes. The first framework was developed for K-12 teachers (e.g., elementary and secondary) as the need was deemed high due to the compulsory nature of education at this level involving protected populations especially prone to harm because they lack the power to resist processes, tools, or approaches they disagree with.

Current ECET Framework Components

The existing K-12 ECET tool resulted from a five-stage development, validation, and revision process conducted with instructors and experts. The development, review, and revision stages included:

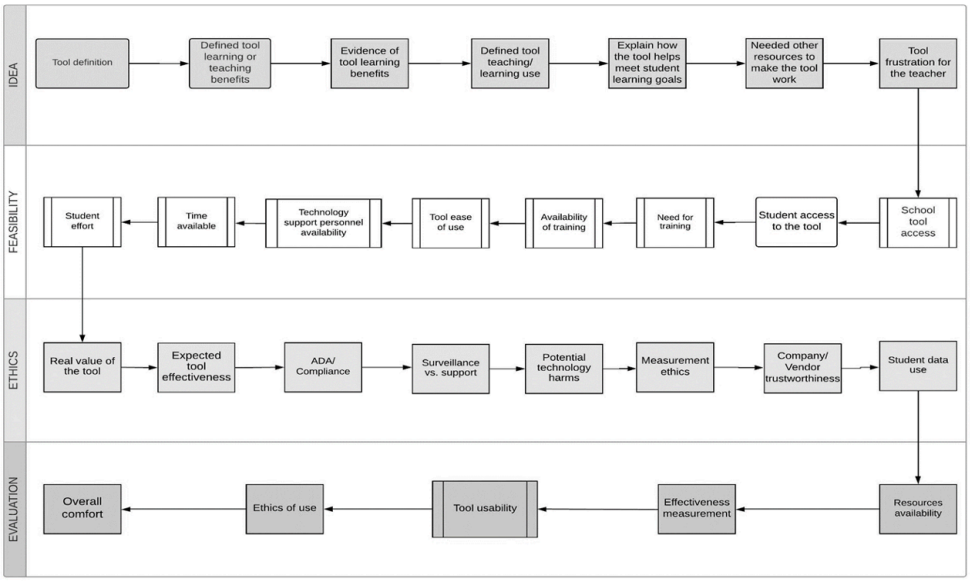
1. Brainstorm initial teacher framework components grounded in existing ideation, ethics, and praxis models. This step required a literature review to locate existing ethics frameworks for educational technology to identify commonalities and gaps in those models.
2. Gap analysis with existing components to identify needed ethics and praxis components. In this step, we identified formal components for inclusion in the draft initial framework to overcome gaps and supplement commonly identified aspects from existing models.
3. Create an initial framework for review by educator experts. The authors constructed the first version of the framework, ordering the nodes by their teaching practices while also seeking alignment with instructional design processes and models such as ADDIE and ASSURE and anchored instruction that can be used cyclically for revision to curricular development over time.

4. Review of the initial framework by instructors with a focus on improving content and linguistic structure contained in nodes to ensure readability and use value. At this stage, the authors asked five instructors working in elementary, middle, and high school settings to review the framework for feedback on its logical structure and order of questions and identify missing components.
5. Revise the initial framework and initial teacher guide using instructor feedback. In this phase, the framework was revised to ensure the logic followed teachers' common practices, and additional nodes were created while some were combined or eliminated.
6. Faculty expert review of revised framework. With the revised framework completed, it was presented for feedback to a faculty member from another institution with expertise in instructional design and past K-12 teaching experience.
7. Revise the framework (2nd). The framework was revised using the faculty expert's feedback to add two question nodes they felt were missing and another two combined. Some question language was revised to simplify them and ensure they more plainly communicated expectations. Further, the academic-aligned version of the framework used to explain underlying educational reasoning was revised to align with the teacher version.
8. Instructor review of revised framework and teacher guide creation (2nd). Another group of five instructors made up of different teachers from the first group then reviewed the twice-revised framework to provide additional feedback. Several minor edits were recommended to clarify question language, and two additional nodes were suggested for combination due to perceived redundancies, while one was suggested for addition.
9. Revision of the framework (3rd). The instructors' suggestions were reviewed and incorporated into the framework to improve its perceived clarity and usefulness.
10. Use application framework evaluation by instructors using think-aloud discussion protocol coupled with a sample educational technology. Seven instructors participated in the usability evaluation. Each instructor selected an educational technology product, employing the framework to evaluate and produce a score. The teachers explained challenges with question nodes as they applied the framework, highlighting any structural problems with the node ordering or clarity of language.
11. Revision of components to the current framework version. Using the teachers' feedback from the application evaluation, the framework was revised again to produce the current, validated version.

By engaging in a rigorous, cyclical design, review, and revision process, we intended to provide a tool that teachers can use daily, written in a language accessible to practitioners. Further, the ECET K-12 framework is intended to be flexible so it can grow as technology, ethics, or practical realities change over time; the ECET K-12 framework as it is presently constituted after the process is presented in the following figure.

Figure 1

ECET K-12



ECET K-12 (Beck & Warren, 2020)

The framework was initially more complex, with additional nodes in each of the four swim lanes (i.e., idea, feasibility, ethics, and evaluation), intending to support teachers' engagement with deep thinking about the potential problems. The tool was originally written in academic language/jargon, reflecting the perceptions and views of the framework's developers. These were revised based on instructors' feedback to ensure practitioner usability.

Idea Nodes

The eight idea components (nodes) in the first swim lane were developed to help instructors evaluate whether the tool they want to use and the purpose they have for it are possible to implement. These questions aimed to ensure that the reason for choosing an educational technology and its perceived learning affordances aligned with the teachers' purposes for adoption. The questions associated with these nodes ask them to think through the tool itself, how it is intended to meet specific learning goals, evaluate evidence of tool efficacy, and perform other thinking about whether their tool-focused learning idea is sound. Once teachers have determined whether the idea should move forward with this specific tool, they are asked to consider its feasibility, given other constraints.

Feasibility Nodes

The next set of swim lane nodes was created to ask teachers whether their idea could be implemented and integrated into their school day. Considerations are made relative to their or their students' available time, need for and availability of training, human and technology support resources, tool access, and other relevant factors. Once the idea and feasibility are deemed acceptable, the next set of components asks teachers to consider the ethics of the technology product through different lenses since if the idea is not sound nor feasible to implement, there is no reason to proceed to the next stage.

Ethics Nodes

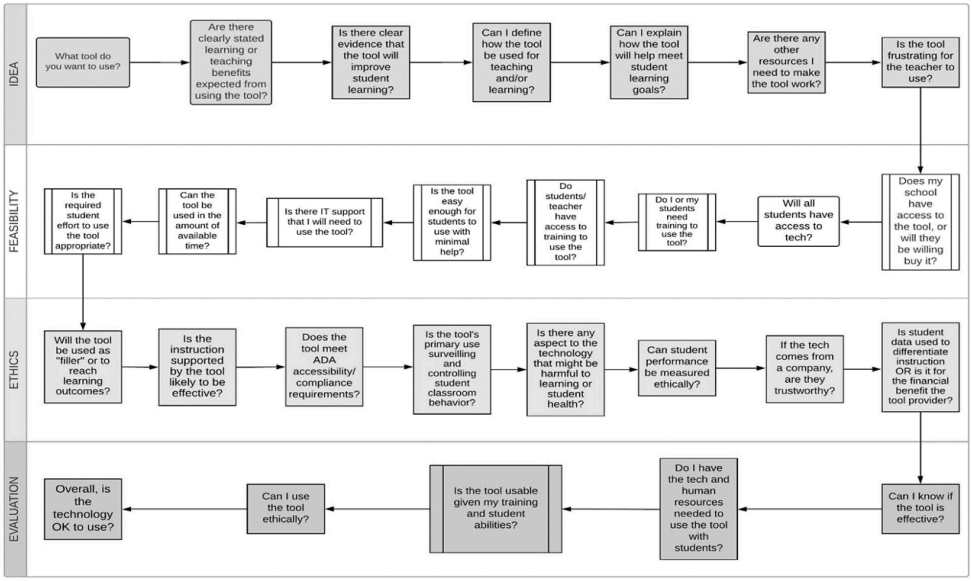
The ethics swim lane components were designed to take instructors on a short path from the feasibility of their idea and whether they can use it to whether they should use it. Because ethics is a consideration of whether a process, tool, or activity may lead to harm, the question of “Should I” is central to the components in this section of the ECET tool. The first question asks teachers to consider whether the tool will be used for educational purposes (ethical) versus to fill time in a school year without specific learning outcomes and lessons. This question is asked because some educators in classrooms commonly use educational technologies to avoid teaching, not to meet learning outcomes (e.g., show a movie). Once that component is reviewed, other elements, such as the present evidence of a tool’s effectiveness for their teaching purpose, accessibility, and questions about the technology’s vendor, help teachers think through whether it is ethical to use the tool. If a teacher finds the tool unethical at any stage in this swim lane, we recommend eliminating it to protect their students. Since the first three major components of the ECET framework walk teachers through 23 discrete questions, we find it helpful for them to conclude the process by revisiting their overall impression of the tool and their use plan.

Evaluation Nodes

When teachers complete their thought processes in the first three lanes, they are asked to conduct a final evaluation of the tool. This set of questions ensures that they feel comfortable using the tool based on their impression of the idea, the feasibility of successful implementation, and the ethics of a tool’s use before deciding to proceed. They are first asked to determine if they have the technology and human resources to implement the tool-supported lesson(s) successfully. Next, they consider whether they can ethically measure learning resulting from using the tool, followed by whether the instructor and students can successfully use it. Then, they are asked whether the tool can be ethically implemented based on a global consideration of items in the third lane. Last, they can consider their overall impression of a tool and their planning for use as a final opportunity to reconsider if they have any qualms about its use. Figure 2 presents the current version of the ECET framework tool for K-12 teachers with all associated questions.

Figure 2

ECET framework for K-12 teachers with questions



While the tool continues to be studied to determine its efficacy in classrooms as an ethics consideration model for teachers, the team realized that there are already many technology-based lessons teachers use today that were created by outside companies and instructional designers, which pointed to a gap in practice that was not currently being addressed.

Need for ECET Instructional Design Framework

Existing processes and models used to support instructional design (e.g., ADDIE, ASSURE, Backwards Design, etc.) commonly do not incorporate ethics questions into the thought processes of educational developers. Instead, they are commonly focused on the structural creation of lessons, courses, and other programs of study that often incorporate technology without the ethics of using these tools. Further, current instructional design models tend not to incorporate the practical and ethical perspectives or needs of instructors or students because instructional design typically focuses on expeditious development, not processes for determining whether that delivery mechanism is ethical. The framework can be employed with any instructional design processes or models during a step that asks designers to consider including a technology to support learning (e.g., analysis, design).

As such, a practical need exists to develop an ECET ID framework for professionals to guide their thinking in developing educational technologies. Instructional design textbooks and programs historically focus on the structural components of instructional design based on student and instructor needs from the perspective of learning related to specified outcomes (Piskurich, 2015; Warren et al., 2013; Warren & Lin, 2012; Reigeluth, 1999). The goal of the design of the framework for ECET ID was to support professional training in the field of instructional design. It is meant to support individual thinking or shared discussion regarding the ethics of choosing a particular technology under consideration for inclusion in a lesson or instructional module or to support a whole course. The purpose is broadly to give

instructional developers questions that allow guidance on thinking through the consequences of their decisions from the users' perspective.

Translation Development Methods

In this section, we will explain the process used by the authors to translate the ECET teacher evaluation components into appropriate questions for instructional designers based on their differential tasks and specific needs.

Step 1

The beginning approach to development was to review each component of the K-12 framework and evaluate whether it applied. If a question component did not fit or was inappropriate based on the perspective presented (e.g., instructor instead of designer), it was targeted for elimination or adaptation. Further, if the instructional design thinking process suggested reordering, the component nodes were moved into a more logical order.

Step 2

Next, each component's guiding questions were revised so that they could be read from the instructional designer's perspective based on common audience analysis approaches (e.g., instructor and student). This was intended to aid a developer's ability to answer the component questions from the perspective of the individual lenses they should consider from an ethical perspective.

Step 3

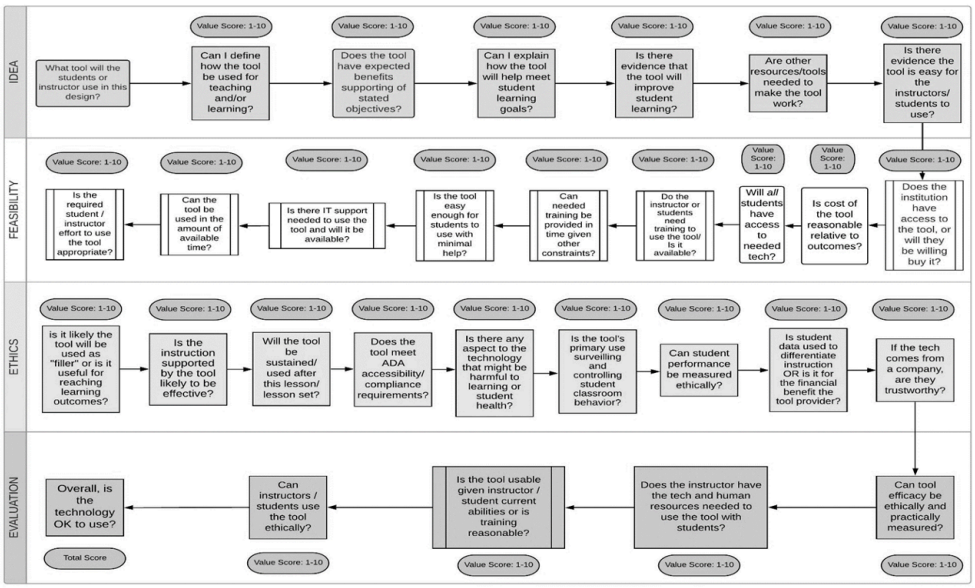
Third, the development team reviewed the components targeted for elimination or adaptation. Although none were removed after that discussion, the language was revised to inform the designer better. Two nodes were also added to focus on cost considerations.

ECET ID Structuring

This section describes the high-level structure of the applied ECET ID framework that resulted from this recursive design, review, and revision process. All components are intended for use during an analysis phase of any instructional design model that instructional designers or teams apply. The following figure presents the current ECET ID tool as it exists today.

Figure 3

ECET Instructional Design (ID) framework



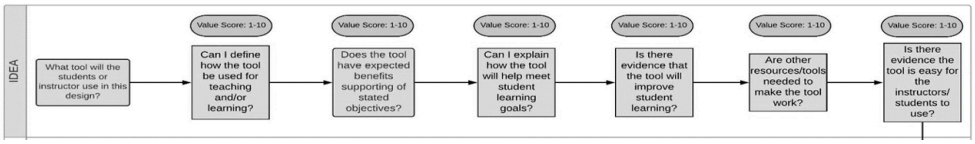
With the validation of the ECET K-12 framework tested, we revised those nodes from that tool to take the viewpoint of an instructional designer. However, to improve the use value of the tool, we also sought to maintain the perspective of the teacher and student needs as paramount, leading to the first swim lane including variations on the original seven question nodes.

ECET ID Idea Nodes

As presented in the following figure (reading left to right) and aligned with the ECET K-12 framework, the instructional designer first identifies and describes the learning tool they intend to use.

Figure 4

ECET ID Idea planning nodes to evaluate whether the tool meets desired outcomes



Once the tool is identified, the designer is asked to specify how they intend to use it for teaching and learning support. Next, they will describe the educational technology's expected benefits or learning affordances in detail, followed by the provision of logic as to why its adoption is valuable to meet the intended learning goals or objectives. Once these descriptions are provided, designers are asked to provide evidence that the tools should improve learning and consider other necessary technologies. For example, an interactive

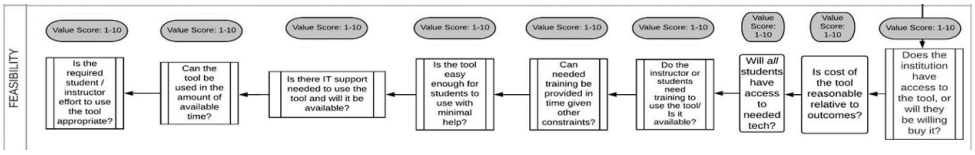
smart board may require an LCD projector, USB or HDMI connectors, and additional software installed on a local computer. Finally, the instructional developer is asked to consider ease of use with the tool in the context of their intended audience of students and teachers. In our experience in K-12 and higher education settings, even interesting tools with strong pedagogical affordances will remain unused if the use difficulty exceeds the intended audience's value or abilities. Once the idea for using the tool is deemed sound enough to proceed, the implementation's feasibility is evaluated.

ECET ID Feasibility Nodes

The feasibility review lane reads right to left and includes a possible 90 points. The first node in Figure 5 focuses on determining the tool's availability within the institution or the need to purchase.

Figure 5

ECET ID Feasibility swim lane containing question set to assess whether a tool can be used given available resources



There is already widespread technology adoption in some schools, so including a document camera that is already available in most university classrooms is a reasonable expectation. However, if the instructional design requires the purchase of ten sets of virtual reality headsets, checking whether this is a reasonable request is a good starting point if cost is a necessary condition for the educational plan to be accepted by stakeholders. This cost node was added to ECET ID because assessing and discussing whether the client can bear the cost of a tool adoption is required to build a successful learning design. Further, considering whether the cost of the tool is reasonable given the expected learning outcomes is an important next step because spending $50,000 on a set of tools that results in a 1% increase in learner engagement may not be considered reasonable and can stop an intended design from reaching implementation. Additionally, the lack of existing tools and the high cost to purchase them means most students will not have access to the technology, preventing the adoption of the learning plan.

The next two nodes (4-5) ask the designer to think about whether training is needed to use the tool, whether it is available, and if it can be provided in the available time. Given the time constraints in many educational situations and sometimes the high need for training before implementation, these questions are important to consider before moving forward. Further, human resources support based on ease of use and demand for information technology (IT) support is covered in nodes 6-7 because low usability and a need for high support can lead to failed instructional implementation. The final two nodes ask the designer to consider the feasibility of implementing the tool and related activities within time and effort constraints. In K-12 settings, there is often limited time to use new tools because of test software use

and other school day activities, resulting in insufficient time on task to achieve learning gains promised by a tool. Further, suppose a tool requires a lot of cognitive effort to figure out and too much trial and error. In that case, the instructor may stop using and shift to lower-effort approaches to teaching that they are more familiar with, and students can complete with higher comfort.

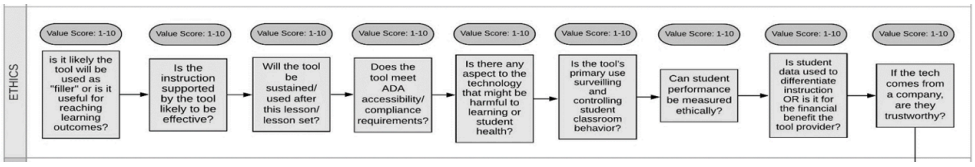
At this point, the ECET ID user has answered 17 questions focused on the practical reality of employing the tool as part of their design because whether to proceed is a complex consideration. Once the designer has considered these questions and found the tool feasible, they should consider the ethics of using an intended technology.

ECET ID Ethics Nodes

Like the feasibility question set, the ethics lane contains nine components read left to right. The first two questions in Figure 6 help designers consider their and educators' intentions for using the tool.

Figure 6

ECET ID Ethics question set with basic thought process regarding tool value/uses



More broadly, a challenge with instructional design and curriculum development can be a mismatch between what the tool's affordances can realistically provide and our intentions for them. When this mismatch exists, the tool's use can be a "filler" that takes up instructional time but cannot realistically support learning outcomes. As such, the tool asks designers to consider whether their intentions match the likely outcomes; failing to do so can result in lost instructional time, leading to educational harm (Warren & Lin, 2012).

The third node was added as part of the ethical consideration involved in the potential waste production generated by technology adoption. As instructional designs continue to grow in scale and given the potential e-waste involved in adopting educational technology tools, longer-term impacts are an increasingly important consideration when planning instruction (Warren et al., 2022). Next, we ask designers to consider the accessibility of their educational technology for students with any impairment as defined by the Americans with Disabilities Act. As schools, universities, and workplaces are increasingly held accountable for supporting their students and employees from a disability perspective, it is increasingly important to consider whether the technologies we adopt are designed in a manner that makes them usable by students with visual, auditory, and other challenges (Martín-Gutiérrez et al., 2017) to make sure all students and workers have what they need to be successful.

Designers are next asked to consider other potential harms from the project without consideration of potential benefits. This is because any harm, especially for children, is

assumed to outweigh potential benefits. For example, untested products like learning games that lack research evaluation on their efficacy could teach poor mental models to students. When this occurs, the instructor and students lose significant instructional time due to reteaching by other means to eliminate the negative models and learn the correct ones (Warren & Lin, 2011). As a result, there may be insufficient time for students to learn other needed knowledge and skills, leading to minor or major student harm. With the increasing number of untested educational technology products in an unregulated commercial market, the likelihood of harm is increasing, so this question should be examined more critically than in the past. With no requirement that companies provide evidence of significant improvements from their products, coupled with lax regulations on marketing language in this area, instructional designers should be wary of educational technology effectiveness claims before recommending their adoption as part of an instructional plan.

Related to ensuring an ethical attitude towards the tools that students use, the next node asks designers to consider the purpose of the instructional tool. Increasingly, some vendors' tools are designed not to improve student learning or improve support for the learner experience but instead to surveil and control student behavior to punish perceived transgressions. Because of the need to deliver learning online or in alternative formats, there is increasing demand for products to address perceived acts of academic dishonesty by students during assessment; however, these products often have no other pedagogical value and can create significant emotional and psychological harms for students required to use them (Krutka et al., 2021; Andrejevic & Selwyn, 2020). As such, the next question asks designers to consider whether, using this product, student performance can be measured ethically. The increasing use of student metadata and inferential statistics to judge students, coupled with poorly designed online testing tools, increases the likelihood that negative conclusions about students and their performance will be made. As with other heuristics, the more transactional distance placed by technology between the learners and the instructor making judgments about students' performance, the more likely they are to be incorrect because context is removed. As such, instructional designers should carefully consider educational technology tools used for assessment or have assessment components that should be evaluated for ethics and efficacy. Maintaining the psychological and physical safety of the educational recipients is a complex task that falls within the purview of all educators, including instructional designers. Just as with research compliance expectations provided by institutional review boards, instructional designers have an ethical responsibility not to harm those that engage with our educational products, whether these be courses, games, or other technology products we choose to incorporate to support learning and teaching (Warren & Lin, 2012).

In the next node related to student assessment and data collection, the designer is asked to consider the vendor's purpose for gathering that information. Historically, student performance data was used to determine whether a student learned. In instances where they did not, it helps an instructor determine how to intervene, reteach, or differentiate instruction in later lessons (e.g., personalized learning). However, with the complexity and lack of transparency in vendor digital models today, it is increasingly difficult to determine how demographics, metadata about students, and performance data are being used and whether they are being sold for profit. As such, the designer should consider whether the data being collected is primarily for the benefit of learners and instructors or the financial benefit of the vendor.

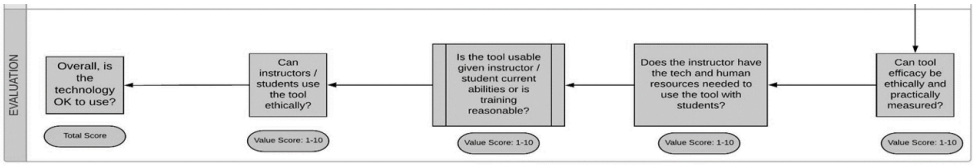
Finally, designers are asked whether the tool vendor can be considered trustworthy. This determination can be made by examining reviews posted by past clients and, increasingly, journalism pieces and legal suits a company is involved in related to the ethics of their products, marketing claims relative to actual performance when available, and the company's decisions. With many companies today profiting from the sales of user data, it is important to consider whether that constitutes a privacy violation for your intended learners. If they are only offered one option for technology interaction and that product may unethically collect data about the learners with no opportunity to opt-out, a better decision is likely to choose another product with similar affordances but without the surveillance and sales aspect or to offer multiple options. Our decisions about which educational technology companies to work with, especially companies that may be untrustworthy, may be viewed as the designer behaving unethically through their choices. As such, this question becomes important if a designer wishes to be viewed as ethical.

ECET ID Evaluation Nodes

The evaluation nodes match those in the K-12 teacher version and provide a final review of the three main elements of idea, feasibility, and ethics before using a tool in an instructional design.

Figure 7

ECET ID Evaluation components to summarize the designer's views of tool inclusion value



The first question (far right) asks designers to revisit whether an educational technology can be ethically and practically measured. Given the increasingly "black" box nature of complex technologies on the market that fail to disclose their designs, it is difficult to determine whether today's educational technologies were developed in a manner that instructors, students, and designers will agree are both effective and offered in a manner that leaves students and instructors with the power to resist negative applications. It is difficult to understand how positive or negative outcomes result if we do not know what a tool is doing to us. While corporate trade secrets are valuable and competition can be fierce, failing to disclose how a product's psychological structure is intended to support learning can make it difficult to trust, so designers should consider whether to recommend it.

Next, the designer is asked to think globally about whether the instructor will have the technology and other supports available to ensure all learners can benefit. This question may be situational and impact where an instructional design can be used. For example, in one setting where every student has access to a Chromebook, asking them to interact with a website for assessment daily is reasonable and efficient. In another setting where 35 students share computers with an uncertain internet connection, the answer to the

questions in this node is different. This contextual difference continues in the third node, where the designer is asked to consider whether the learners and instructors have sufficient training to ensure successful implementation of the tool, process, or full learning design. In our experience, a lack of training can lead to a failed technology implementation as often as a poorly designed technology. With that in mind, the fourth node asks the designer to make one final judgment regarding whether they believe the educational technology can be used ethically. This opportunity to reconsider the ethics of the tool on a more global scope after answering more specific questions is intended to allow the designer to think through the relationships of all of these questions to get a broader impression of the tool's ethics component before moving to the final node and making a high-level assertion that a.) their idea for the tool is a good one, b.) it is feasible to use the tool, and c.) the tool can be used ethically in the setting intended and with these users.

To avoid unusable work or product development, the ECET ID tool ideally should be employed either prior to any design work or after learning goals and activities are planned to determine whether it is ethical to proceed. However, because the suggested approach to applying the ECET ID framework is not intended to be complex, taking less than 20-30 minutes for each review, it can be revisited at any time throughout an instructional design, development, or implementation planning process. At a minimum, we recommend that a review with scoring is completed once the design plan is complete but before development begins. Since changes often occur during learning product development, it is helpful to revisit the framework once the product and associated tool are ready for use as a final check to ensure the productive outcome of this process remains one that the designer and users feel meets their practical and ethical requirements.

ECET ID Application Example

To illustrate the use of ECET ID, we present simple evaluations as a use case from the perspective of instructional designers. As such, we next provide a model application of the framework in the context of developing an undergraduate or K-12 introductory multimedia development course. A major consideration will be to evaluate potential tool options to choose from and seek to make the best choice for our audience.

In this illustration of using ECET ID, we examine whether to adopt the GNU Image Manipulation Program (GIMP) 2.1 or the Adobe Creative Suite as an educational tool for an introductory multimedia development course. A consideration will be the identified learning objectives for this course. Since the course topic could be for either senior-level high school students or introductory students in undergraduate multimedia programs, the choice of instructional technology may differ based on various constraints and local needs, so the choice rationale in each context is explained. Other learning outcomes for the course are not linked to the educational product under review for adoption. Thus, the following table presents the multimedia-focused course goals and objectives.

Table 1

Multimedia-focused course goals and objectives

Component	Description
Course Goal 1.0	Employ industry-standard graphics software to create computer graphics for mediated learning/training.
Objective 1.1	The learner will develop an infographic to teach a simple concept for learner retention.
Objective 1.2	The learner will develop a training handout to support a set of 1-2 learning objectives.
Course Goal 2	Apply common graphic design principles using a common industry tool.
Objective 2.1	The learner will employ color theory in a manner that makes their educational media appealing to users.
Objective 2.2	The learner will employ consistent visual design principles in each educational media course outcome.

The scores for each component should be generated to give the designer a sense of how the technology performed for each component. This approach can help designers compare scores between possible instructional technology products when making a tool selection choice that will most likely be effective for the target users.

In this section, we present the scores for each product as rated by the authors as an illustration of the process. While it is not required that instructional designers have more than one scorer, it is a stronger practice from a qualitative research paradigm to have multiple analysts review the products to increase the credibility and trustworthiness of the review outcomes (Ravitch & Mittenfelner Carl, 2016). All scores for each item were capped at 10 points each, except the overall evaluation component. As such, the total number of possible points is 200 to make comparison across potential educational technology products easier for users. While all scoring includes an element of subjectivity, the guidelines for each node are the following, though they vary somewhat by item as specified in the user guide because some are yes (10 points) or no (1 point) questions:

- Score of 1: Construct is not at all present and described, or the answer to the node's question is an unequivocal "No." For example, when determining whether there is evidence of the product's educational efficacy, the designer reviews the product's website and public research sources (e.g., Google Scholar); no research studies are available that support the company's assertions that the technology's use supports student learning.

- Score of 3: Construct is noted but not described. For example, when reviewing the product's efficacy, the website says, "Parents and teachers tell us they learn a lot from

our product!" and user quotes do not reflect formally conducted qualitative studies to support the claim.

- Score of 5: Construct is present but remains vague and abstract. The designer reviews the website, and the company claims, "We protect student and teacher privacy!" but there is no explanation as to how the company does this, and further review of public data sources indicates the company may sell certain data if the product is adopted without notifying the users.

- Score of 7: Construct is present and described but could benefit from stronger evidence or concreteness. The designer reviews the product's website, and there are two or three small-scale qualitative research studies done by the company rather than independent researchers. These findings support the claims, but with the lack of significant numbers to bolster the findings, the score remains lower.

- Score of 10: Construct is fully present, concretely evident, and well described, or the answer to the node's question is an unequivocal "Yes."

Scores not listed above provide the reviewers with a range they can use, depending on the strength of evidence provided during their reviews, allowing analysts to provide. Further, to simplify scoring, a table was created to align each component, question, and scoring outcome with simplified language representing the questions in each node to allow these to fit in the corresponding cells (see Figure 8).

Figure 8

Ethical Choices with Educational Technology Instructional Design framework blank scoring table

ECET ID Component	1	2	3	4	5	6	7	8	9	Total
Idea	Define tool use for learning?	Tool benefits align to objectives?	Explain tool's use for goals?	Evidence that the tool is effective?	Other resources needed?	Tool ease of use evidence?				
Score	___/10	___/10	___/10	___/10	___/10	___/10				___/60
Feasibility	Tool access at institution?	Is the cost reasonable?	Do all students have tool access?	Instructor/ student training access?	Time or other resources needed for training?	Tool has strong ease of use?	IT support available?	Enough time to use tool?	Student/ instructor effort is appropriate?	
Score	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/90
Ethics	Tool is useful to reach learning outcomes?	Tool will likely support instruction?	Tool will be used beyond this design?	Tool is ADA compliant?	Are there potential tool harms?	Tool main use controlling and surveilling?	Learner performance can be measured	Learner data used to differentiate instruction or	Is the tech vendor trustworthy?	
Score	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/10	___/90
Evaluation	The tool's efficacy can be practically/ ethically	Instructor has tech/ human resources needed to use.	Tool is usable or training is available.	The tool can be employed ethically.	Overall, from global perspective, is the tool OK to					
Score	___/10	___/10	___/10	___/10	___/20					___/60
									Total Score	___/300

The items in Figure 8 follow the path listed in the Figure 3 diagram, but because of the need to follow the logic of the table, each is listed from left to right. In the following section, we apply the framework first to the GNU Interface Manipulation Program (GIMP) 2.1 digital tool and then to the Adobe Creative Suite because these two have media affordances that may be appropriate to the course's learning goals and objectives.

Product Evaluation 1: GIMP 2.1

The GNU Interface Manipulation Program (GIMP) is a photograph or other image tool allowing graphic design with many line, erase, and other common media development tools found in many of today's online and software-based products. According to the product's website (gimp.org), the photo editing tool has existed since 1998 (v.1.0), though it was publicly released in 1996 (v. 0.54). Some of the other tools that are part of Adobe Creative Suite/Cloud, which we compare to GIMP, are older, originating in the mid (Illustrator) and late 1980s (Photoshop) or later with InDesign [1999] (Hoang, 2019). With a similar length of time in development, the GIMP tool is as stable as its main competitors from Adobe and other companies, making it a reasonable option from that perspective for consideration in this course. In the next section, we provide an example of how a designer may vet the idea of whether to use it for an introductory multimedia development course using ECET ID by reviewing the website and downloading the product for consideration. The scores in Figure 9 and indicated in parentheses in the following discussion reflect the reviewers' assessment and include suggested cutoff scores. However, each design team can create their own.

Figure 9

Ethical Choices with Educational Technology Instructional Design framework scoring: GIMP 2.1 completed scoring table

ECET ID Component	1	2	3	4	5	6	7	8	9	Total
Idea	Define tool use for learning?	Tool benefits align to objectives?	Explain tool's use for goals?	Evidence that the tool is effective?	Other resources needed?	Tool ease of use evidence?				*Cutoff=50*
Score	10/10	10/10	10/10	7/10	7/10	6/10				50/60
Feasibility	Tool access at institution?	Is the cost reasonable?	Do all students have tool access?	Instructor/ student training access?	Time or other resources needed for training?	Tool has strong ease of use?	IT support available?	Enough time to use tool?	Student/ instructor effort is appropriate?	*Cutoff=65*
Score	10/10	10/10	10/10	10/10	10/10	7/10	5/10	9/10	7/10	78/90
Ethics	Tool is useful to reach learning outcomes?	Tool will likely support instruction?	Tool will be used beyond this design?	Tool is ADA compliant?	Are there potential tool harms?	Tool main use controlling and surveilling?	Learner performance can be measured	Learner data used to differentiate instruction or	Is the tech vendor trustworthy?	*Cutoff=65*
Score	10/10	10/10	7/10	4/10	10/10	7/10	5/10	9/10	7/10	81/90
Evaluation	The tool's efficacy can be practically/ ethically	Instructor has tech/ human resources needed to use.	Tool is usable or training is available.	The tool can be employed ethically.	Overall, from global perspective, is the tool OK to					*Cutoff=50*
Score	10/10	7/10	8/10	10/10	16/20					51/60
									Total Score *Cutoff=50*	260/300

Idea Planning

With GIMP as the tool under consideration, the first three question nodes are addressed concurrently because the technology will be taught as the means to create educational media (10) and is therefore expected to directly support the stated learning objectives (10) by allowing them to create educational media as course end products (10). While there is no direct evidence GIMP will improve learning, allowing students to learn to use it and build successful media artifacts, which achieves the learning goals for the course (7). Besides a mid-range computer, we assume no other tools are needed (7), though a large monitor may help make use easier. The wide adoption of the tool in industry and education settings,

according to our examination of public reviews, is evidence that the tool is easy for students and instructors to use for the course (6). With the idea vetted with a passing score of 50 out of 60 points, we then examine the feasibility of using GIMP to meet our learning design intentions.

Feasibility Planning

Since the software is freely available for PC, GNU/Linux, or Mac operating systems (10), unless students are using Chromebooks, the tool will be fully available. Since it is free to download and use (10), there is no cost to students, faculty, or institution (10). A review of the GIMP website indicates 17 available training sessions of various levels, with more available on YouTube, so adequate training can supplement what is created by the instructor or designer (10). Two limitations are limited evidence of ease of use (7) and the expected lack of IT support at the target institution (5) because it is outside of the scope of provided services as no media editing tools have been adopted institution-wide (5). Since the goal of the instruction is to provide training on the tool, while not guaranteed for every student, the available time (9) and expected effort (7) should be appropriate to meet learning objectives. With this review complete and a score of 78 of 90 points, whether it is ethical to adopt the tool into the design is next considered.

Ethics Planning

The GIMP tool is central to achieving the learning objectives for the course (10). Therefore, the tool-supported instruction will likely be practically effective (10) and available for future courses at no cost (10), making it a financially sustainable choice. According to GIMP's provision of information using the Voluntary Product Accessibility Template (VPAT), the product meets some accessibility compliance requirements. However, for visually impaired students, it is an open question as to whether it is usable relative to available time and individual student needs leading to the assignment of a low score (4). However, the visual nature of the course and tools will make choosing a compliant tool challenging. We do not believe the tool's technological or psychological aspects are likely to harm student health (10) nor that there are surveillance or control aspects embedded in GIMP (10), allowing student performance to be ethically measured through students' designed formative and summative media products (10). We found no evidence that the GIMP tool stores learner data (10) nor that challenges result from the vendor's trustworthiness (10). With a score of 81 out of 90 possible points, GIMP appears to be usable ethically, leading to the final review and evaluation.

GIMP Product Evaluation

Based on our global review of GIMP as a possible tool for course adoption, its efficacy appears to be an aspect that can be practically and ethically measured through student and instructor feedback (10) rather than decontextualized metadata. For our purposes, the instructor will have the available tech needed. However, the needed human resources required to implement GIMP with students in the course remain somewhat questionable, leading to a score of 7 for this component. The tool appears usable according to available reviews and public information about the tool's use and potential training sources (e.g., videos, PDFs, etc.). However, there remains some uncertainty since our target instructor has

only used Photoshop in the past (8). Since the tool is used for creation rather than assessment or other purposes, we believe it can be used ethically (10). The product was given a global score of 16 out of 20 because the various ECET components left designers with the impression that the idea is reasonably sound, the product implementation is feasible, and it is an ethical choice. Still, because of unknowns with the instructor and IT support resources, there remain questions we cannot answer. Next, we use ECET ID to review the second product under consideration, the Adobe Creative Suite/Cloud product that tends to be the industry standard for media editing and development.

Product Evaluation 2: Adobe Creative Suite or Cloud

The Adobe Creative Suite has multiple components that may be useful for the multimedia course, including Photoshop (photo manipulation), Illustrator (illustration), Premiere (video), and InDesign (publishing). This makes the paid tool more robust than GIMP, which only includes options for photo manipulation and some illustration support. However, the cost is also high at $240 a year for students and instructors or $20 per month versus GIMP, which is free. In the following sections, we modeled the thought process of an ECET ID user examining the Adobe Creative Suite for later comparison with GIMP 2.1. The associated scores are shown in Figure 10.

Figure 10

Ethical Choices with Educational Technology Instructional Design framework scoring: Adobe Creative Suite completed scoring table

ECET ID Component	1	2	3	4	5	6	7	8	9	Total
Idea	Define tool use for learning?	Tool benefits align to objectives?	Explain tool's use for goals?	Evidence that the tool is effective?	Other resources needed?	Tool ease of use evidence?				*Cutoff=50*
Score	10/10	10/10	10/10	8/10	7/10	7/10				52/60
Feasibility	Tool access at institution?	Is the cost reasonable?	Do all students have tool access?	Instructor/ student training access?	Time or other resources needed for training?	Tool has strong ease of use?	IT support available?	Enough time to use tool?	Student/ instructor effort is appropriate?	*Cutoff=65*
Score	7/10	7/10	7/10	10/10	8/10	7/10	4/10	9/10	7/10	66/90
Ethics	Tool is useful to reach learning outcomes?	Tool will likely support instruction?	Tool will be used beyond this design?	Tool is ADA compliant?	Are there potential tool harms?	Tool main use controlling and surveilling?	Learner performance can be measured	Learner data used to differentiate instruction or	Is the tech vendor trustworthy?	*Cutoff=65*
Score	10/10	10/10	8/10	4/10	10/10	10/10	10/10	10/10	10/10	82/90
Evaluation	The tool's efficacy can be practically/ ethically	Instructor has tech/ human resources needed to use.	Tool is usable or training is available.	The tool can be employed ethically.	Overall, from global perspective, is the tool OK to					*Cutoff=50*
Score	10/10	5/10	8/10	10/10	18/20					51/60
									Total Score *Cutoff=50*	251/300

Idea Planning

Adobe Creative Suite and Cloud would be taught to students as tools to develop their own media and multimedia projects in support of the primary learning goals for the course. Since the course goals include creating new educational media using such tools, and the tool was used for similar purposes in other departmental courses, though at the graduate level

providing evidence of efficacy to improve student learning. A challenge in the idea is that the tool can require a higher-end computer and is only usable on Mac and Windows operating systems, so it cannot be implemented with Chromebooks. As such, it may not work in the high school environment. While it is a complex tool, new students exposed to it in graduate courses have been able to use it successfully, and instructors are already familiar with it. The overall evaluation for the idea components was 52 out of 60 points. This indicates the tool should meet the course learning outcomes and basic audience usability; next, the feasibility of implementation with the Adobe Suite is examined.

Feasibility Planning

Starting with access, the university does not currently offer the tool to students, but educational pricing is available that would cost them $80 for the course duration. This is about the cost of a textbook, and since it is an industry-standard tool, the cost-to-benefit ratio appears reasonable. A department chair or principal scheduling instructors to teach the course must ensure that anyone teaching it has sufficient skills to deliver a course that uses the Adobe Suite successfully. Students will learn the tool as a course goal, so that component is achieved through related materials and learning activities. As a common media development tool used in the field and industry, it is easy to use for development in this course. One challenge may be that the institution offers uncertain information technology (IT) support, so any instructor must also serve as technology support. The tool should be able to be learned and used in the available class time, and the effort appears to be appropriate. With the soundness of the idea and tool use feasibility established, the ethics of implementing the technology is next examined.

Ethics Planning

Because the Adobe tools are central to what students are learning, they will be directly tied to learning outcomes and will support the identified instructional aims of the course. Since other courses in the department also use the tool, it should be sustainable in case students want to do a yearlong subscription that covers more than one related media development class. A challenge with the tool is its visual nature, so there are questions about ADA accessibility that should be followed up on with institutional teams responsible for this component. Since this is a tool for creating media, there do not appear to be inherent potential harms to student health, and no surveillance aspects appear that are present in some testing software. Since student performance is measured based on the quality of their media products supported by the tool, the ethics of this aspect are acceptable. No student use data is collected by the tool we can determine. Further, the technology company has a history of being trustworthy relative to users. With the ethics evaluation indicating a passing score, we conduct a final global product review before comparing Adobe Creative Suite and GIMP for this educational media development course.

Adobe Product Evaluation

Since Adobe Creative Suite is used to create educational media, the instructor should be able to ethically and practically measure the tool's value based on how well it supports student learning. Measures related to course outcomes can be developed about products the tool helped students create. The instructor should have the necessary technology if the

institution pays for Adobe Creative Suite or Cloud. A question remains whether they will have local human technology support if questions arise they cannot answer. Instructors should be selected based on having prerequisite knowledge of Photoshop, Illustrator, and other Adobe Suite tools. Further, since part of the course goals are to teach these technologies, training is included in the course. There do not appear to be significant ethical challenges with the tool or the vendor, and overall, Adobe Creative Suite/Cloud could be practically and ethically used for the proposed media course. The following table provides the shared scoring for Adobe Creative Suite as a potential tool for the media development course.

Final Product Score Comparison and Decision Making

Once the evaluations are complete for each product, we can compare them based on the total score or on component criteria that are most important to the designer or end-users. Table 2 can be used to break out and compare scores and look at the components in aggregate.

Table 2

Ethical Choices with Educational Technology Instructional Design framework scoring: Product comparison for final selection

ECET ID Component	***GIMP***	***Adobe Suite***	Best Choice
Idea Score	50/60	52/60	*Adobe*
Feasibility Score	78/90	66/90	*GIMP*
Ethics Score	81/90	82/90	*Adobe*
Evaluation Score	51/60	51/60	N/A
Total Score	260/300	251/300	*GIMP*

While the Adobe Suite was the best choice for supporting the idea and ethics components, the overall scoring was higher for GIMP, partly because of its higher cost and availability in the feasibility section. Otherwise, the digital affordances of each tool were similar enough with minor scoring differences that either could be selected to meet the course needs. Note that in most regards, we say the tool should meet the needs of instructors and students because our evaluation views are naturally subjective, meaning there will be times we will come to incorrect determinations of the right tool in a particular situation. However, by completing this thought process, an instructional designer can have clearer logic to support and explain the choice of tool to the client or a manager who would need to pay for or implement the technology adoption. This approach allows designers to forecast and explain their decision-making clearly, reducing the risk that a poor technology or design decision will be made while acknowledging this risk cannot be eliminated.

Limitations

There are several limitations to this work. First, a tool like those in the ECET portfolio should be validated to accurately measure what it aims to do, regardless of the respondent. Valid instruments help to collect better quality data with high comparability, which reduces the effort while increasing the credibility of collected data. Although ECET K-12 was subject to an extensive qualitative validation process (Beck & Warren, 2020), it will continue to be quantitatively and qualitatively validated every few years to ensure it achieves its intentions. By using the ECET tool actively with instructional designers each year and incorporating feedback from surveys and interviews cyclically to improve the instrument, the acceptance of ECET should improve and be maintained. This adapted ECET ID instrument has not yet been validated by designers. As such, we will follow a similar validation process as was conducted with ECET K-12 noted earlier, so the team expects significant changes to the terminology used in questions and nodes included/excluded in the framework to ensure the views and needs of designers are accommodated. This current state of the instrument also means that initial usage of ECET ID may provide less accurate results than the ECET K-12 tool for teachers.

Additionally, the current version of our framework places more weight on feasibility and ethics (90 points each) compared to 60 points for Idea and Evaluation. These differences in weighting reflect our current understanding of the comparative relevance of these areas for instructional designers. With that said, we plan to conduct user testing of ECET ID with multiple instructional designers in multiple contexts (e.g., K-12, higher education, adult, etc.) and update these weightings resulting from testing.

Implications

Student Loss of Learning Time Due to Ineffective Tool

As stated earlier, current instructional design models and textbooks (Piskurich, 2015; Warren & Lin, 2014; Reigeluth, 1999) do not utilize ethical questions to aid instructional designers in their design process (e.g., ADDIE, ASSURE, Backwards design, etc.). Additionally, current instructional design models do not include practical and ethical perspectives on the needs of instructors or students. Using the ECET ID framework should help instructional designers focus on ethical concerns while designing high-quality instruction. Ethical questions are integrated into ECET ID along with concerns about ideation, feasibility, and evaluation, thus helping instructional designers to address ethical concerns in their proper context. As reflection and discussion are the intended outcomes of ECET ID, it is expected that using this framework will improve quality instructional designs that clearly match designers' intentions with likely outcomes and thus reduce educational harms to end users (Warren & Lin, 2012).

Next Steps

Our next step with ECET ID is a rigorous validation process similar to the process followed with ECET K-12 designed for teachers with a multi-step design-based research approach to improve the tool's components based on feedback followed by new participants that could ensure changes were effective and then point out other needed revisions. Additionally, work is being done to put both tools into a branching, online format that will scaffold users in using the tool and provide recommendations based on their answers. Finally, a version of ECET is being developed for software developers through a partnership with INESC TEC, a private non-profit research association dedicated to scientific research and technological development, technology transfer, advanced consulting and training, and pre-incubation of new technology-based companies. Once the tool is deemed effective and ethical to implement, it will be released broadly to determine whether it is useful to instructional designers at scale.

Conclusion

As technology choices for instructional developers, educators, and students continue to grow more complex in their designs, our choices regarding which to use are based on the quality of the idea, whether it will work with the time and other resources we have, and whether it is ethical to implement them at all. Moving forward with our use and study of the tool, we intend to release it broadly to gather user views about whether it supports their needs and to gather information about additional needs for framework improvement that exist (e.g., carceral technologies/surveillance as assessment, environmental ethics) and should be addressed in future versions. We hope to slightly slow down our design processes with the tool to encourage designers to ask relevant questions about whether we should use a technology. This needs to slow down and consider our decisions regarding whether to use any technology is increasingly important in a world focused on surface-level, rapidly produced outcomes. Instead, for instructional designs to meet the needs of an increasingly diverse world, mindful designs are important for ensuring the journey instructors and learners take is one they can feel good about and meets their educational needs. Our primary goal in designing the Ethical Choices with Educational Technology Instructional Design framework was to support an instructional designer's decision-making process to help improve the user's final learning product and technology interactions. It is meant to go beyond simple questions regarding whether a tool meets minimal performance outcomes and positively supports learner and instructor experience. In the future, we will rigorously test the tool, making improvements along the way, always asking whether the framework improves the ethical choices made by designers and users in a manner that both improves learning and fosters an experience they look back upon favorably.

References

Andrejevic, M., & Selwyn, N. (2020). Facial recognition technology in schools: critical questions and concerns. *Learning, Media, and Technology, 45*(2), 115–128. https://doi.org/10.1080/17439884.2020.1686014

Beck, D., & Warren, S. (2020). ECET: A proposed framework to guide ethical instructor choices with learning technologies. Association for Educational Communications & Technology. https://convention2.allacademic.com/one/aect/aect20/index.php?cmd=Online+Program+View+Session&selected_session_id=1697338&PHPSESSID=v2ehlnunjt2pgqr0p2sh9rq1nq

Chou, H. L., & Chen, C. H. (2016). Beyond identifying privacy issues in e-learning settings–Implications for instructional designers. *Computers & Education, 103*, 124–133. https://doi.org/10.1016/j.compedu.2016.10.002

Gray, C., & Boling, E. (2016). Inscribing ethics and values in designs for learning: A problematic. *Educational Technology Research & Development, 64*(5), 969–1001. https://doi.org/10.1007/s11423-016-9478-x

Himelboim, I., & Limor, Y. (2008). Media perception of freedom of the press: A comparative international analysis of 242 codes of ethics. *Journalism, 9*(3), 235–265. https://doi.org/10.1177/1464884907089007

Hoang, W. (1999). 20 Years of Adobe InDesign. *Adobe Blog*. https://blog.adobe.com/en/publish/2019/08/26/20-years-of-adobe-indesign

Klein, J. D., & Jun, S. (2014). Skills for instructional design professionals. *Performance Improvement, 53*(2), 41–46. https://doi.org/10.1002/pfi.21397

Krutka, D. G., Smits, R. M., & Willhelm, T. A. (2021). Don't Be Evil: Should We Use Google in Schools? *TechTrends, 65*(4), 421–431. https://doi.org/10.1007/s11528-021-00599-4

Lin, H. (2007). The ethics of instructional technology: Issues and coping strategies experienced by professional technologists in design and training situations in higher education. E*ducational Technology Research and Development, 55*, 411–437. https://doi.org/10.1007/s11423-006-9029-y

Lucey, T. A., & Grant, M. M. (2008). Ethical issues in instructional technology: An exploratory framework. *Multicultural Education & Technology Journal, 3*(3), 196–212. https://doi.org/10.1108/17504970910984871

Martín-Gutiérrez, J., Mora, C. E., Añorbe-Díaz, B., & González-Marrero, A. (2017). Virtual technologies trends in education. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(2), 469–486. https://doi.org/10.12973/eurasia.2017.00626a

Palm, E. & Hansson, S. O. (2006). The case for ethical technology assessment (eTA). *Technological Forecasting & Social Change, 73*, 543–558. https://doi.org/10.1016/j.techfore.2005.06.002

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology, 45*(3), 438–450. https://doi.org/10.1111/bjet.12152

Papamitsiou, Z., Filippakis, M. E., Poulou, M., Sampson, D., Ifenthaler, D., & Giannakos, M. (2021). Towards an educational data literacy framework: Enhancing the profiles of instructional designers and e-tutors of online and blended courses with new competencies. *Smart Learning Environments, 8*(18). https://doi.org/10.1186/s40561-021-00163-w

Ravitch, S., & Mittenfelner Carl, N. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological* (1st ed.). Sage Publications, Inc.

Reigeluth, C. M. (1999). What is instructional-design theory and how is it changing? In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 2, pp. 5–29). Lawrence Erlbaum Associates.

Schenk, K., & Williamson, J. (2005). *Ethical approaches to gathering information from children and adolescents in international settings*. https://doi.org/10.31899/hiv10.1013

Spector, J. M. (2016). Ethics in educational technology: Towards a framework for ethical decision making in and for the discipline. *Educational Technology Research and Development, 6*4(5), 1003–1011. https://doi.org/10.1007/s11423-016-9483-0

Steele, P., Burleigh, C., Kroposki, M., Magabo, M., & Bailey, L. (2020). Ethical considerations in designing virtual and augmented reality products—virtual and augmented reality design with students in mind: Designers' perceptions. *Journal of Educational Technology Systems, 49*(2), 219–238. https://doi.org/10.1177/0047239520933858

Tzimas, D., & Demetriadis, S. (2021). Ethical issues in learning analytics: a review of the field. *Educational Technology Research and Development, 69*, 1101–1133. https://doi.org/10.1007/s11423-021-09977-4

Warren, S. J., Lee, J., Najmi, A. (2014). The impact of technology and theory on instructional design since 2000. In: J. M. Spector, M. D. Merrill, J. Elen, & M. Bishop. (Eds.) *Handbook of research on educational communications and technology* (4th ed., pp. 89–99). Springer, New York, NY. https://doi.org/10.1007/978-1-4614-3185-5_8

Warren, S. J., & Lin, L. (2014). Ethical considerations for learning game, simulation, and virtual world design and development. In *K-12 education: Concepts, methodologies, tools, and Applications* (pp. 292–309). IGI Global. https://doi.org/10.4018/978-1-4666-4502-8.ch017

Warren, S. J., & Lin, L. (2012). Ethical considerations for learning game, simulation, and virtual world design and development. In: H. H. Yang & S. C.-Y. Yuen (Eds.) *Handbook of research on practices and outcomes in virtual worlds and environments* (pp. 1–18). IGI Global. https://doi.org/10.4018/978-1-60960-762-3.ch001

Warren, S., Moran, S., & McGuffin, K. (2022). Planning to incorporate energy conservation practices, renewable energy production systems, and eco-friendly building design practices to support sustainability in US public schools. In E. Zio, P. Pardalos, M. Fathi, & Khakifirooz (Eds.), *Handbook of smart energy systems*. Springer. https://doi.org/10.1007/978-3-030-72322-4_4-1

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Towards Socially-just Design Through Ethical Decision-making

Stefaniak, J. E.

Decision-making Ethics Instructional Design Social Justice

The deficiencies of instructional design models are that they do not explicitly provide guidance on how to address systemic implications of design decisions and activities. Decision-making is an activity in which instructional designers engage continuously throughout their design projects. The purpose of this chapter is to provide an overview of an ethical decision-making process. Recommendations are offered on how instructional designers can address ethical decisions and their consequences in their design practices.

Introduction

Decision-making is an activity in which instructional designers continuously engage throughout their design projects. Studies examining instructional designers report that they make decisions involving how best to deliver instruction, instructional sequencing, and

assessment strategies (Kenny et al., 2005; Kumar & Ritzhaupt, 2017; Rowland, 1992; Wedman & Tessmer, 1993). While these examples are somewhat generic, upon deeper examination, they become more complex depending on several factors that may influence the learning environment.

Most situations in which instructional designers will find themselves involved are ill-structured (Jonassen, 2000). Ill-structured problems may have multiple possible solutions, and these solutions, in turn, may require several interrelated decisions (Jonassen, 2012). Depending on the complexity of the problem and the amount of time allowed for instructional designers to make decisions, they may follow two primary decision-making processes. Normative decision-making involves an individual considering multiple options and weighing the advantages and disadvantages of each option before arriving at a decision(Jonassen, 2012). Naturalist decision-making processes are often referred to as dynamic processes as they are contextually embedded and often require individuals to make prompt decisions (Klein, 2008; Stefaniak, 2020).

Recognizing the complexities inherent in decision-making for ill-structured problems, opportunities for gray areas emerge, posing questions about whether the decisions made and implemented are optimal and equitable (Lin, 2007). When we consider designing instruction that is socially just, we must ask ourselves:

- Am I designing instruction that provides examples that are relatable to my students?
- Is diversity reflected in instructional materials? Do my students see representations of themselves?
- What are the expectations for students accessing instructional content? Do they have access to the content?
- Do my students have the same opportunities to practice inside and outside the learning environment?
- Have I addressed learner accessibility?

The extent to which questions like the ones mentioned above are addressed is often determined by the time allocated for a project, access to appropriate technological resources, money, and the design team's expertise. While studies have been conducted to gain a better understanding of how instructional designers manage constraints and make decisions during their projects (i.e., Boling et al., 2017; Hoard et al., 2019; Zhu et al., 2020), little emphasis has been placed on the extent to which an ethical lens has been applied to their design decision-making.

In recent years, there has been an increased push among scholars in educational technology to place learners at the forefront of our design practices to promote inclusion, equity, and accessibility (Bradshaw, 2018; Gray et al., 2022; Kimmons, 2020; Moore, 2021). Upon further exploration into the deficiencies of current instructional design practice, there is opportunity for the field to shift its focus to address the overarching question: Are we doing what is best for our learners?

In a paper examining how needs assessment strategies need to be reevaluated to promote equity in instructional design, Stefaniak and Pinckney-Lewis (in press) note that several instructional design models suggest a paternalistic approach in which instructional

designers identify problems and determine which needs are worth exploring. This approach suggests that designers impose solutions on the learning audience with little consideration given to their actual needs. These challenges are further exacerbated in other phases of the instructional design process, as noted by Moore (2021). By adopting a more empathetic approach to designing assessments and considering the conditions that influence our learners, instructional designers are better able to collect contextually relevant information that can inform updates to the design process.

Purpose

Ethical decision-making models have been proposed throughout the past several decades to support individuals as they engage in decision-making. The fields of medicine and human counseling have placed importance on how these models can support practitioners as they interact with patients and clients. It is important to note that ethical decision-making models are not intended to make ethical decisions for individuals. Instead, they are meant to lay out a process to guide individuals through decision-making to help them identify areas of ethical concern (Keith-Spiegel & Koocher, 1985).

To advance this question with our learners in mind, several scholars have raised concerns that our field has ignored socially just practices (e.g., Benson et al., 2017; Bradshaw, 2018; Dickson-Deane et al., 2018; Gunawardena et al., 2019; Moore, 2021). Moore (2021) suggested that existing instructional design models are not the ones we need. With most models being developed in the 1970s, many of them lack specific guidance to address accessibility, equity, and inequalities that are prevalent in learning environments. Rieber and Estes (2017) noted that accessibility is minimally addressed or ignored altogether in our instructional design models. In a paper examining the instructional design and technology timeline through a social justice lens, Bradshaw (2018) calls for more attention to be placed on critical gaps in the field that hinder learner performance.

Looking at issues related to inequities and oppression in our field raises the question of whether these issues could be mitigated if designers had the tools that they need, such as training in design practices that account for multiple stakeholders of a project, learners with diverse needs, and strategies to modify instruction to meet the individual needs of the learner audience. Could some of these issues be avoided if we teach designers to approach their design through an ethical lens? As Moore (2021) notes, ethics are not addressed in our instructional design models, which often lay the foundation and guide the instructional practices of novices in our field. While she has called upon the field to take deliberate action to examine our design practices through an ethical lens to support learners across a variety of contexts, further attention is also needed to explore how designers engage in ethically sound decision-making processes.

It is important to note that instructional design models are not inherently bad. They provide guidance on the fundamental mechanics of the instructional design process (Dousay, 2018). However, the deficiencies of these models in our field lie in their failure to explicitly provide guidance on addressing the systemic implications of design decisions and activities (Stefaniak & Xu, 2020), ethical approaches to solving instructional problems (Moore, 2021), and inclusive and accessible design practices (Bradshaw, 2018; Rieber & Estes, 2017).

Our field can ameliorate these challenges by helping instructional designers become more cognizant of their decision-making practices. If instructional designers are taught how to become more self-aware of the decisions they make throughout their projects and emphasize the importance and need of ethical decision-making, they can still benefit from using existing instructional design processes and models to guide their design work.

This chapter provides an overview of an ethical decision-making process. The various types of ethical decisions are reviewed in relation to instructional design practices. Recommendations for future research on instructional design practices support continued discussions on how instructional designers can intentionally integrate ethical decision-making into routine design tasks.

The Process of Decision Making

Decision-making is the process of making a choice by identifying a decision, gathering information, identifying possible solutions, considering the advantages and disadvantages of each option, and selecting a resolution to move forward (Skyttner, 2001). "A 'decision' is a commitment to a course of action that is intended to yield results that are satisfying for specific individuals" (Yates, 2003, p. 24). There are a variety of decisions an individual may make. These include choices, acceptances/rejections, evaluation, and constructions (Yates & Tschirhart, 2006). Table 1 provides an overview of what these types of decisions may look like in instructional design, as depicted by Stefaniak (2020a).

Table 1

Decision Typologies as They Relate to Instructional Design

Type	Example of Instructional Design Decisions
Choices	An instructional designer has been asked to help a local museum develop learning materials for their patrons. During their brainstorming meeting with the museum staff, they discussed the possibility of using audio headsets, mobile learning, QR codes, online learning modules, and face-to-face training programs as training options.
Acceptances/ Rejections	An instructional designer submits a proposal to present their project at a national instructional design conference. Reviewers responsible for reading the proposal must decide whether to accept or reject the conference proposal.
Evaluation	An instructional design firm in a metropolitan city meets with a not-for-profit organization to discuss their training needs. During a few initial conversations, the firm realized that their client would not be able to pay the typical fees they charge for their instructional design services. The CEO of the instructional design firm sees the impact that the not-for-profit has made in the local community and decides that they can offer a few of their services pro bono.

Type	Example of Instructional Design Decisions
Constructions	An instructional design program discusses the options for offering two special topics courses to their students in the upcoming year. Program faculty discuss possible topics and discuss which ones might be of the most interest to their students. During their discussions, they identify potential course instructors and look to see how this might impact regular course offerings and instructor assignments.

Decision-making, regardless of the type of decision, can be categorized according to two processes: rational or dynamic. Rationale processes typically take more time as an individual engages in eight steps (Jonassen, 2010; Klein, 1998):

1. Identify the problem
2. Establish decision criteria
3. Weigh decision criteria
4. Generate alternatives
5. Evaluate the alternatives
6. Choose the best alternative
7. Implement the decision
8. Evaluate the decision

A dynamic decision-making process is often more time-sensitive, where an individual makes decisions quickly based on contextual factors influencing a particular situation (Klein, 2008). When engaged in dynamic decision-making, individuals are more apt to conjecture and make decisions based on their knowledge and expertise, the information they have available at that particular time, and within the constraints inherent in the situation (Murty et al., 2010).

A majority of instructional design problems are ill-structured (Jonassen, 1997) and call for dynamic decision-making. Upon examining how instructional designers engage in conjecture, Stefaniak et al. (2018) have offered the following definition for design conjecture in instructional design:

the ability to form an opinion based on constrained information and resources to design solutions that take into account systemic factors influencing an environmental context (p. 59).

While there is growing interest in studying how instructional designers engage in decision-making (e.g., Boling et al., 2017; Demiral-Uzan, 2015; Gray et al., 2015; Korkmaz & Boling, 2014; Stefaniak et al., 2022), very few have examined the ethical nature of decision-making (Tzimas & Demetriadis, 2021; Gray & Boling, 2016; Lin, 2007).

Ethical Decision-Making

Moore and Ellsworth (2014) express concerns that the field of educational technology has approached ethics in instructional design from a peripheral view. While educational

organizations such as the Association for Educational Communications and Technology have a code of ethics, there is a paucity of research examining what these ethical practices look like in the field nor mechanisms for how ethical practice can and should be carried out in instructional design activities (Moore, 2021).

In a review examining ethical decision-making models to support counseling practices, Cottone and Claus (2000) identified nine models that address ethics within their process. While there are slight differences in the number of steps, the common processes inherent in these models include identifying the problem, defining potential issues, consulting ethical guidelines, considering possible consequences of each decision, estimating the probability of desired outcomes, and deciding on the best course of action (Correy et al., 1998; Keith-Spiegel & Koocher, 1985; Steinman et al., 1998). The steps outlined in these frameworks suggest a linear approach that aligns with rational decision-making processes (Klein, 1998). Recognizing that the majority of instructional design decisions are dynamic in nature (Jonassen, 2012), guidance is needed to understand how steps toward ethical decision-making can be woven into existing dynamic decision-making processes inherent in instructional design.

Ethical Decision-Making in Instructional Design

In her paper, *The Design Models We Have Are Not the Design Models We Need*, Moore (2021) calls for members of our field to explore possible solutions that deliberately address ethics (and the current lack thereof) in our current design practices. While I agree with Moore (2021) that there is a clear absence of the acknowledgment of ethics in our existing instructional design models, I want to proffer an approach that does not call for the development and plethora of new instructional design models.

Rather than proposing the conception of a new instructional design model, I want to offer the suggestion that we keep our instructional design models intact and instead provide an overlay model that supports ethical decision-making to guide instructional designers through their activities. In doing so, the overlay model would support the non-linearity and iterative nature of instructional design (Jonassen, 2008). Therefore, I propose that instructional designers be guided through how to integrate the following ethical decision-making process into their design activities:

1. Interpret the situation
2. Establish the parameters of the problem
3. Identify potential issues
4. Consult ethical guidelines
5. Generate possible solutions
6. Consider possible consequences of each decision
7. Choose a course of action
8. Implement the decision

9. Evaluate course of action

Taking into account that instructional designers make decisions throughout the instructional design process, these suggested steps for engaging in ethical decision-making may be applied at multiple decision points. The following sections briefly overview these nine steps and offer examples of how they may be woven into various decision points. It is important to note that these guidelines are not meant to be interpreted as a linear process. Instead, various steps may be revisited as the instructional designer undertakes a recursive and iterative approach to design.

Interpret the Situation

Most practice-based ethical decision-making models recommend that the first step in decision-making is to identify the problem (e.g., Corey et al., 1998; Forester-Miller & Davis, 1996; Steinman et al., 1998). In Tarvydas' (1998) decision-making model, project identification is framed as an interpretation of the situation. I have intentionally followed Tarydas' (1998) approach to interpreting the situation because it suggests a broader view of the situation and context. This approach supports the discourse that has discussed the relationship between the designer, their learning audience, and the situation.

Tymchuk's (1986) model refers to this initial phase as determining the stakeholders. I resonate with this phrasing because it is common practice to identify the stakeholders when conducting a needs assessment in instructional design (Kaufman & Guerra-Lopez, 2013; Selmer, 2000; Stefaniak, 2021a; Watkins et al., 2012). Determining the stakeholders entails considering all individuals or groups who may be involved or impacted by the decisions made and solutions implemented within the community.

While this step in the decision-making process should be iterative throughout the project as decisions are continually made, it is most likely that interpreting the situation would occur during the needs assessment phase. It is also important to note that needs assessment should be implemented as a means of validating the identified or perceived problem (or need). This process should extend beyond the learner analysis to support a more comprehensive understanding of the situation (Stefaniak, 2020b).

Establish the Parameters of the Problem

Instructional designers inherently establish parameters of their projects, whether consciously or not. We are accustomed to navigating our design process to accommodate design constraints imposed by our learning audience, additional stakeholders, and the overall system. An instructional designer embarks on designing their solution during these initial decision-making phases. Their process is often described by the design field as a co-evolution (Maher et al., 1996; Dorst & Cross, 2001). The co-evolution involves the designer continually "re-interpreting a design problem in the light of an exploration of possible solutions" until a good fit emerges (Dorst, 2019; p. 60). While I labeled a step in the ethical decision-making process as generate possible solutions, the process of establishing the parameters of the problem initiates this co-evolution process.

Within this step, it would be beneficial for an instructional designer to acknowledge the realities of the situation. Based on the information obtained while interpreting the situation, the instructional designer should identify the relevant constraints that impact their project. This practice essentially involves the instructional designer establishing a bounded rationality to progress with their design (Stefaniak et al., 2020).

Establishing a bounded rationality is the process of utilizing available information, one's cognitive abilities and limitations, and time to make decisions (Simon, 1969). Within bounded rationality, individuals make decisions while recognizing that optimization may not be feasible (Cuofano, 2021). Instructional designers can benefit from establishing bounded rationality when approaching their design and ethical decision-making by acknowledging their design environments' inherent limitations, risks, and uncertainties. By doing so, they can effectively manage their design space.

Identify Potential Issues

Within this decision-making phase, instructional designers should identify any anticipated challenges that may arise in the environment. These challenges may include issues or limitations initially identified during the needs assessment phase when interpreting the situation and identifying key stakeholders associated with the project. Examples of potential issues could include members of the learning community having inadequate access to learning materials, socioeconomic issues impacting a learner's ability to participate fully in an instructional experience, or a lack of resources that hinders the implementation of suitable solutions to address needs.

Consult Ethical Guidelines

Most practice-based ethical decision-making frameworks in the counseling field recommend that practitioners consult with the profession's ethical guidelines while engaging in decision-making. The same expectations should be adhered to by instructional designers. While instructional designers do not have to go through maintaining certifications and licensures the same way counseling or medical professionals have to, they should consult ethical guidelines to inform their decisions. The Association of Educational Communications and Technology (AECT) developed a Code of Professional Ethics (2020) designed to inform design practice.

Moore (2021) notes that why a code of professional ethics exists, not all designers know how to integrate these standards into their work. She notes that this is largely due to the absence of ethical considerations in our existing design models. I echo Moore's (2021) sentiments and add that a lack of ethical decision-making frameworks to guide instructional designers is another area of concern. This paper aims to join Moore and suggest that instructional designer preparation include an intentional focus on AECT's Code of Professional Ethics (2020) and provide them with strategies to ensure these standards are addressed in their design praxis.

Generate Possible Solutions

Once the instructional designer establishes a bounded rationality to support the management of their design space and consults with ethical guidelines, they should generate multiple possible solutions before selecting one to implement fully. This approach also supports the concept of ideation recommended in the design thinking philosophy (Razzouk & Shute, 2012). Considering the realities that instructional designers regularly engage in design uncertainty (e.g., Jonassen, 1997; Tracey & Hutchinson, 2016), the need for ideation is even more prevalent as an instructional designer establishes a bounded rationality to address design optimization.

There is a scarcity of studies examining ideation in instructional design (Stefaniak, 2021b). It is important to note that other studies have demonstrated that instructional designers often face challenges with generating ideas when confronted with uncertainties and design constraints (i.e., Hoard et al., 2019; Stefaniak et al., 2018, 2022). These findings highlight the importance of supporting instructional designers in navigating the co-evolutionary process of negotiating between the problem space and solution space (Dorst, 2019).

Consider Possible Consequences of Each Decision

As an instructional designer engages in ideation and generates multiple possible solutions, they consider the possible consequences of each decision. The level of their understanding of the environment and situation will greatly drive their awareness of consequences. Examples of some ethical consequences that an instructional designer may face while identifying an optimal solution may include, but are not limited to:

- Implementing a solution that knowingly does not meet the needs of a group of learners
- Being aware that the implementation of a solution is not going to address the needs identified during a needs assessment
- Ostracizing learners through failing to address social inequities that exist in the environment
- Relying on technologies imposed by others in the environment that are not conducive to the needs associated with the project.

At this stage, an instructional designer fully becomes aware of the ambiguity associated with ethical decision-making. This further reiterates the need for instructional designers to approach bounded rationality with an understanding that optimization is often out of reach when decisions are needed (Gigerenzer & Selten, 2001). Economists have suggested that emphasis on achieving optimization should be abandoned, and a bounded rationality should be assumed (Laville, 2010).

Choose a Course of Action

Upon considering possible consequences of each decision, the instructional designer should finalize their decision. Ideally, their decision is grounded in sound design principles, adheres to ethical standards, and poses limited risks to the learners and the learning environment.

The instructional designer can then proceed with planning once they have committed to moving forward with a particular course of action.

Implement the Decision

Implementing the decision could mean several things in the instructional design space. It could mean moving forward with designing interventions as well as moving into the delivery and facilitation of instruction. What is important to note is that decision-making does not stop once a course of action has been decided upon or enacted. Dynamic decision-making is iterative and recursive (Jonassen, 2008; Klein, 2008).

When implementing the decisions, instructional designers should continuously survey the environment where decisions are being implemented to respond accordingly and promptly should modifications to any decisions be warranted. While dynamic decisions require continuous surveillance of the environment and local affordances, attention must be given to how this impacts a focus on ethics. Further exploration is needed to understand how instructional designers are modifying decisions in situ.

Evaluate the Course of Action

The instructional designer should evaluate the success of their decision upon implementation. At this time, they should scan the environment to determine the extent to which the solution meets the needs of the learners and other stakeholders associated with the project (Stefaniak, 2021a). Evaluation of ethical design decisions should not be completed at the end of a project; rather, it should be ongoing as the instructional designer engages in iterative design. When evaluating the course of action, the instructional designer should examine the extent to which the solution addressed the needs (or problem) initially identified at the beginning of a project, the extent to which there may be ethical consequences with the implemented decision, and whether the current course of action needs to be modified.

Future Explorations and Conclusions

The purpose of this chapter is by no means intended to provide a definitive solution for addressing ethical decision-making in instructional design; rather, it is intended to contribute to the discussion to support the momentum of efforts exploring socially just design practices. Gray and Boling (2016) examined ethical commitments instructional designers make as part of their design work through the lens of several case studies published in the International Journal of Designs for Learning. The scholars looked for instances where instructional designers noted or demonstrated their ethical commitments and values in everyday practice. More case studies are needed to understand how instructional designers engage in ethical decision-making, what types of instructional strategies support socially just learning, and what types of support are needed by professional organizations to guide ethical development among instructional designers.

As more emphasis is placed on the role ethics plays in instructional design, research is required to better understand how ethics integrates into interactive design processes. The following questions should be considered to continue the discussion and exploration of how developing an awareness of ethical decision-making can support instructional designers:

- How do instructional designers address ethics in their design decisions?
- What challenges do instructional designers encounter when striving to adhere to ethical design practices?

Developing an understanding of how instructional designers incorporate ethics into their decision-making will contribute to advancing research on ethical design practices. It will also help to identify areas where support can be provided to instructional design students in their professional development.

I am skeptical that additional instructional design models are needed; rather, I think we should place more emphasis on training instructional designers on how they engage in ethical decision-making models within various decision points in the instructional design process. While helping disciplines (e.g., counseling, medicine, allied health, social work) have several practice-based ethical decision-making models, the field of learning, design, and technology warrants similar attention. If a primary goal of instructional design is to facilitate learning and improve performance (e.g., Richey et al., 2011), then it is imperative that we have the necessary infrastructure to guide ethical development among instructional designers.

References

Association for Educational Communications and Technology (AECT). (2020). The code of professional ethics. *Association for Educational Communications and Technology*. https://members.aect.org/Intranet/Publications/ethics/

Boling, E., Alangari, H., Hajdu, I. M., Guo, M., Gyabak, K., Khlaif, Z., Kizilboga, R., Tomita, K., Alsaif, M., Lachheb, A., Bae, H., Ergulec, F., Zhu, M., Basdogan, M., Buggs, C., Sari, A., & Techawitthayachinda, R. (2017). Core judgments of instructional designers in practice. *Performance Improvement Quarterly, 30*(3), 199–219. https://doi.org/10.1002/piq.21250

Bradshaw, A. C. (2018). Reconsidering the instructional design and technology timeline through a lens of social justice. *TechTrends, 62*(4), 336–344. https://doi.org/10.1007/s11528-018-0269-6

Corey, G., Corey, M. S., & Callanan, P. (1998). *Issues and ethics in the helping professors* (5th ed.). Brooks/Cole.

Cottone, R. R., & Claus, R. E. (2000). Ethical decision-making models: A review of the literature. *Journal of Counseling & Development, 78*(3), 275–283. https://doi.org/10.1002/j.1556-6676.2000.tb01908.x

Cuofano, G. (2021). *What is bounded rationality and why it matters*. FourWeekMBA. https://fourweekmba.com/bounded-rationality/#Optimization_is_not_bounded_rationality

Demiral-Uzan, M. (2015). Instructional design students' design judgment in action. *Performance Improvement Quarterly, 28*(3), 7–23. https://doi.org/10.1002/piq.21195

Dickson-Deane, C., Bradshaw, A. C., & Asino, T. I. (2018). *Recognizing the inseparability of culture, learning, and technology. TechTrends, 62*(4), 310–311. https://doi.org/10.1007/s11528-018-0296-3

Dorst, K. (2019). Co-evolution and emergence in design. *Design Studies, 65*, 60–77. https://doi.org/10.1016/j.destud.2019.10.005

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem-solution. *Design Studies, 22*(5), 425–437. https://doi.org/10.1016/S0142-694X(01)00009-6

Dousay, T. A. (2018). Instructional design models. In R. E. West (Ed.), *Foundations of learning and instructional design technology: The past, present, and future of learning and instructional design technology*. EdTech Books. https://edtechbooks.org/lidtfoundations/instructional_design_models

Gigerenzer, G., & Selten, R. (2001). Rethinking rationality. In G. Gigerenzer, & R. Selten (Eds.), *Bounded rationality: The adaptive tool box* (p. 1–12). The MIT Press.

Gray, C. M., & Boling, E. (2016). Inscribing ethics and values in designs for learning: a problematic. *Educational technology research and development, 64*(5), 969–1001. https://doi.org/10.1007/s11423-016-9478-x

Gray, C., Dagli, C., Demiral-Uzan, M., Ergulec, F., Tan, V., Altuwaijri, A. A., Gyabak, K., Hilligoss, M., Kizilboga, R., Tomita, K., & Boling, E. (2015). Judgment and instructional design: How ID practitioners work in practice. *Performance Improvement Quarterly, 28*(3), 25–49. https://doi.org/10.1002/piq.21198

Gray, C. M., Hasib, A., Li, Z., & Chivukula, S. S. (2022). Using decisive constraints to create design methods that guide ethical impact. *Design Studies, 79*. https://doi.org/10.1016/j.destud.2022.101097

Hoard, B., Stefaniak, J., Baaki, J., & Draper, D. (2019). The influence of multimedia development knowledge and workplace pressures on the design decisions of the instructional designer. *Educational Technology Research and Development, 67*(6), 1479–1505. https://doi.org/10.1007/s11423-019-09687-y

Jonassen, D. H. (1997). Instructional design models for well-structured and III-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1), 65–94. https://doi.org/10.1007/BF02299613

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63–85. https://doi.org/10.1007/BF02300500

Jonassen, D. H. (2008). Instructional design as design problem solving: An iterative process. *Educational Technology*, 21–26. https://doi.org/10.1007/s11423-011-9230-5

Jonassen, D. H. (2010). *Learning to solve problems: A handbook for designing problem-solving learning environments*. Routledge.

Jonassen, D. H. (2012). Designing for decision making. *Educational Technology Research and Development, 60*(2), 341–359. https://doi.org/10.1007/s11423-011-9230-5

Kaufman, R., & Guerra-Lopez, I. (2013). *Needs assessment for organizational success.* ASTD.

Keith-Spiegel, P., & Koocher, G. P. (1985). *Ethics in psychology*. Random House.

Kenny, R. F., Zhang, Z., Schwier, R. A., & Campbell, K. (2005). A review of what instructional designers do: Questions answered and questions not asked. *Canadian Journal of Learning and Technology, 31*(1). https://cjlt.ca/index.php/cjlt/article/view/147/140

Kimmons, R. (2020). Current trends (and missing links) in educational technology research and practice. TechTrends, 64(6), 803–809. https://doi.org/10.1007/s11528-020-00549-6

Klein, G. A. (1998). *Sources of Power: How people make decisions*. MIT Press.

Klein, G. (2008). Naturalistic decision making. *Human Factors, 50*(3), 456–460. https://doi.org/10.1518/001872008X288385

Korkmaz, N., & Boling, E. (2014). Development of design judgment in instructional design: Perspectives from instructors, students, and instructional designers. In B. Hokanson & A. Gibbons (Eds.), *Design in educational technology* (pp. 161–184). Springer.

Kumar, S., & Ritzhaupt, A. (2017). What do instructional designers in higher education really do? *International Journal on E-Learning, 16*(4), 371–393.

Laville, F. (2010). Should we abandon optimization theory? The need for bounded rationality. *Journal of Economic Methodology,* 7(3), 395–426. https://doi.org/10.1080/135017800453751

Lin, H. (2007). The ethics of instructional technology: Issues and coping strategies experienced by professional technologists in design and training situations in higher education. *Educational Technology Research and Development, 55*(5), 411–437. https://doi.org/10.1007/s11423-006-9029-y

Maher, M. L., Poon, J., Boulanger, S. (1996). Formalising design exploration as co-evolution. In J. S. Gero, & F. Sudweeks (Eds.), *Advances in formal design methods for CAD* (pp. 3–30). Springer.

Moore, S. (2021). The design models we have are not the design models we need. *Journal of Applied Instructional Design, 10*(4). https://dx.doi.org/10.51869/104/smo

Moore, S. L., & Ellsworth, J. B. (2014). Ethics of educational technology. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds), *Handbook of research on educational communications and technology* (4th ed, pp. 113–127). Springer.

Murty, P., Paulini, M., & Maher, M. L. (2010). Collective intelligence and design thinking. In *DRTS'10: Design Thinking Research Symposium* (pp. 309–315).

Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? *Review of Educational Research, 82*(3), 330–348. https://doi.org/10.3102/0034654312457429

Richey, R. C., Klein, J. D., & Tracey, M. W. (2011). *The instructional design knowledge base: Theory, research, and practice*. Routledge.

Rieber, L. P., & Estes, M. D. (2017). Accessibility and instructional technology: Reframing the discussion. *Journal of Applied Instructional Design, 6*(1), 9–19. https://doi.org/10.28990/jaid2017.061001

Rowland, G. (1992). What do instructional designers actually do? An initial investigation of expert practice. *Performance Improvement Quarterly, 5*(2), 65–86. https://doi.org/10.1111/j.1937-8327.1992.tb00546.x

Selmer, J. (2000). A quantitative needs assessment technique for cross-cultural work adjustment training. *Human Resource Development Quarterly, 11*(3), 269–281. https://doi.org/10.1002/1532-1096

Simon, H. A. (1969). *The sciences of the artificial*. The M.I.T. Press.

Skyttner, L. (2001). *General systems theory Ideas and applications*. World Scientific Publishing.

Stefaniak, J. (2020a). Documenting instructional design decisions. In J. K. McDonald & R. E. West (Eds.), *Design for learning: Principles, processes, and praxis*. EdTech Books. https://edtechbooks.org/id/documenting_decisions

Stefaniak, J. (2020b). The utility of design thinking to promote systemic instructional design practices in the workplace. *TechTrends, 64*(2), 202–210. https://doi.org/10.1007/s11528-019-00453-8

Stefaniak, J. E. (2021a). *Needs assessment for learning and performance: Theory, process, and practice*. Routledge.

Stefaniak, J. (2021b). Leveraging Failure-Based Learning to Support Decision-Making and Creative Risk in Instructional Design Pedagogy. *TechTrends, 65*(4), 646–652. https://doi.org/10.1007/s11528-021-00608-6

Stefaniak, J., Baaki, J., Hoard, B., & Stapleton, L. (2018). The influence of perceived constraints during needs assessment on design conjecture. *Journal of Computing in Higher Education, 30*(1), 55–71. https://doi.org/10.1007/s12528-018-9173-5

Stefaniak, J., Baaki, J., & Stapleton, L. (2022). An exploration of conjecture strategies used by instructional design students to support design decision-making. *Educational Technology Research and Development*, 1–29. https://doi.org/10.1007/s11423-022-10092-1

Stefaniak, J., & Pinckney-Lewis, K. (In press). A systemic approach toward needs assessment to promote inclusive learning design. In B. Hokanson, M. Exter, M. Schmidt, & A. Tawfik (Eds.), *Toward inclusive learning design: Social justice, equity, and community*. Springer.

Stefaniak, J., Tawfik, A., & Sentz, J. *An embodied framework for supporting instructional design decision-making practices*. American Educational Research Association. (April 17-20, 2020). San Francisco, CA.

Stefaniak, J., & Xu, M. (2020). An examination of the systemic reach of instructional design models: A systematic review. *TechTrends, 64*(5), 710–719. https://doi.org/10.1007/s11528-020-00539-8

Steinman, S. O., Richardson, N. F., & McEnroe, T. (1998). *The ethical decision-making manual for helping professionals*. Brooks/Cole.

Tarvydas, V. M. (1998). Ethical decision making processes. In R. R. Cottone & V. M. Tarvydas (Eds.), *Ethical and professional issues in counseling* (pp. 144–155). Prentice-Hall.

Tracey, M. W., & Hutchinson, A. (2016). Uncertainty, reflection, and designer identity development. *Design Studies, 42*, 86–109. https://doi.org/10.1016/j.destud.2015.10.004

Tymchuk, A. J. (1986). Guidelines for ethical decision making. *Canadian Psychology, 27*, 36–43.

Tzimas, D., & Demetriadis, S. (2021). Ethical issues in learning analytics: A review of the field. *Educational Technology Research and Development, 69*(2), 1101–1133. https://doi.org/10.1007/s11423-021-09977-4

Watkins, R., Meiers, M. W., & Visser, Y. L. (2012). *A guide to assessing needs: Essential tools for collecting information, making decisions, and achieving development results*. The World Bank.

Wedman, J., & Tessmer, M. (1993). Instructional designers decisions and priorities: A survey of design practice. *Performance Improvement Quarterly, 6*(2), 43–57. https://doi.org/10.1111/j.1937-8327.1993.tb00583.x

Yates, J. F. (2003). Decision management. Jossey-Bass.

Yates, J. F., & Tschirhart, M. D. (2006). Decision-making expertise. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 421–438). Cambridge University Press.

Zhu, M., Basdogan, M., & Bonk, C. J. (2020). A case study of the design practices and judgments of novice instructional designers. *Contemporary Educational Technology, 12*(2).

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Integrating Ethics Into Instructional Design Courses and Curricula

Moore, S. L. & Tillberg-Webb, H. K.

Ethics can be intentionally interwoven into introductory instructional design (ID) courses and ID practice without significant additional work through a reframing of foundational content and grounding of the role of an instructional designer as a designer as a "reflective practitioner." In reviewing the literature on ethics, casting a net widely to include literature on critical approaches to technology, we identified three major themes both within instructional design and technology (IDT) and in other design- and technology-oriented disciplines such as engineering on practical approaches to ethics. Those themes center around key practices – reflection, interrogation, and design – that designers use to tackle the ethical problems that arise in practice and that are embedded in the fabric of the problem spaces we work in. In our book, Ethics and Educational Technology (Moore & Tillberg-Webb, 2023), we explored these three themes in depth and created Ethics in Practice

sections for each chapter with readings, resources, and activities on common ethical problems designers confront, such as accessibility, equity, designing for diverse learners, data rights and privacy, and other considerations. Although ethics are, simply stated, a regular feature of the problems and problem spaces that IDT professionals navigate and seek to address, no model in the field addresses or integrates ethics, even a little (Moore, 2021). We would like to see that change. In this chapter, we will discuss ideas for integrating ethics into the typical instructional design course using an example from one of Heather's courses where she has woven in ideas from our text alongside Larson & Lockee's (2020) text, Streamlined ID. We conclude with ideas for ethics across the IDT curriculum where ethical considerations can be incorporated and the implicit ethos of a method or area of study made more explicit.

Ethics Are Part of the Problem Set

To better understand the opportunity presented by incorporating ethics, it's important to recognize that ethics are more than codes of conduct. A focus on ethics is an opportunity to leverage design for a focus on "designing for good" or socially beneficial outcomes. This sense of our social responsibility as a profession has been developing over the past few decades. Yeaman and colleagues (1994) explicitly called for social responsibility to take a central role in how we think about ethics, arguing that our emphasis should be "not on the ethical behavior of individuals, but on the ethical position of educational technology in society" (p.5). They defined social responsibility as an awareness of the broader culture, an understanding of intrinsic values and interests and the roles those play in shaping technologies and their implementations, and a commitment to basic human rights. This evokes a sense of understanding how we as a profession relate to society, and it means that we see our profession – and ourselves as professionals – as functioning within society and our work as having an impact on society. For Reeves and Reeves (2015), "socially responsible" seemed to also involve the idea that the research we conduct and the work we

do must be oriented around helping to solve problems, which they argued is in contrast to a history of focusing on tools or things.

In analyzing research trends in the field, Kimmons (2020) used this distinction between problems and things (e.g., tools) to frame his findings. Across 16 research journals, Kimmons noted a significant gap in research on "broader social issues, arguing that "the field may be struggling to orient its work toward solving relevant real-world problems, and researchers should consider how their efforts can more meaningfully inform socially-responsible policy and practice" (2020, p. 808). This gap has long persisted in the IDT field (Moore, 2009; Moore & Ellsworth, 2014) while other fields – such as business, law, journalism, medical and nursing – have produced much more scholarship on ethics, even with entire journals dedicated to ethics in their disciplines (Davis, 1999).

For too long, ethics in our field has been treated as a code of conduct maintained by a small committee within one association – the Association for Educational Communications and Technology (AECT) – for over 100 years. While codes of conduct serve a purpose, especially within an organizational context as a means of shaping member norms and behaviors, they should not be confused with the much larger idea of professional ethics. In his book, The Goods of Design, Guersenzvaig (2021) argued that codes of ethics and professional ethics are not the same thing, calling professional ethics "a larger rational endeavor that is open to substantiated disagreements emanating from multiple perspectives that may participate in the discipline" (p. 51). Even in trying to interpret a code of ethics for practice, individual professionals still must contend with ambiguities and contextual differences and make decisions about the complex and open-ended nature of ethical considerations. This ties directly to a theme we will explore in this chapter: ethics as design.

The current body of work around ethics across other disciplines invites us to deeply rethink ethics in IDT – and along with that, rethink the problems that we work on as professionals and rethink our practices. Rethinking ethics allows us to see how ethics are not simply a set of codes or statements of principles but are practices. Ethics are a thing that we do and are facets of the problems we work on every day.

Although ethics have historically been ignored in instructional design, we seem to be experiencing our own comparative boom in the last few years. Increased attention to diversity, equity, justice, inclusion and accessibility (a principles-based approach to ethics) appears to have been driven in large part by the pandemic and a recognition that rapid transition to emergency remote teaching left many learners behind (Brooks & Grajek, 2020; Custodio, 2020; Vogels et al., 2020). Additionally, scholars of learning analytics have been writing on the ethical issues of data rights, privacy, and security (e.g., Lachheb et al., 2023; Ifenthaler & Tracey, 2016; Pardo & Siemens, 2014; Scholes, 2016; Slade & Prinsloo, 2013). And of course, discourse on ethics of AI has been practically inescapable since 2023, raising DEIJ and privacy and security concerns along with environmental impacts, bias and discrimination, misinformation and disinformation, and other potential issues. It is exciting to see long-overdue attention, and this highlights how ethical issues are embedded features of the problems and problems spaces we work in that we can no longer ignore. However, that discourse – especially around AI – has been quite loud and runs the risk of feeling overwhelming. Here, we want to distill the work we have been doing in this space into a more manageable set of strategies for IDT instruction and practice. Our goal is that IDT professors

and professionals alike can develop a set of strategies for your own personal practice toolkit from ideas in this chapter.

Practices and Strategies for Embedded Ethics

Elsewhere – such as a chapter in the latest Trends & Issues book, in our book, and in an open chapter here on edtechbooks (https://edtechbooks.org/becoming_an_lidt_pro/professional_ethics) – we elaborated on the themes of reflection, interrogation, and design as the components of an approach to ethics in educational technology in more detail. Here, we will provide very brief summaries then zoom in on specific practices for a more applied approach to ethics and how those can be integrated into instructional design classes and practices.

Reflection

Reflection as an iterative loop in design and development work comes up frequently as a theme. Designers use reflection-in-action (Schön, 1983) in particular, a practice that is emblematic of how design is non-linear in nature. In general design practice, Schön (1983) described this as a process of confronting a problematic situation, defining the problem ("problem setting"), and engaging in an iterative conversation with the problem or situation during the design process. In context of IDT, Tracey & Baaki (2014) described reflection-in-action as "when a designer is presented with a complex problem or situation, the designer shows a series of questioning, making a decision, reflecting on the consequences of the decision, then making another move" (p. 4).

We can combine reflection-in-action with ethics as a way to rethink ethics as a form of reflective practice. Shanks-Kaurin (2018) defined ethics as a process of "reflection, critical questioning, justification, argumentation, and application" (para. 4) on morals, beliefs, and values. Rather than treating ethics as the statement itself of particular values or beliefs, they are the process of reflecting on these. Moore & Griffin (2021) argued that ethics can become a form of reflection-in-action where designers ask particular types of questions throughout their design and development processes just as they ask other questions about function, feasibility, and so on. Key reflective tools that designers and instructors can use for an applied approach to ethics include problem framing and reflective questions, described in the next section. Reflection-in-action in particular is useful as it applies throughout the entirety of design and development processes and thus is a practice that can be integrated all throughout an ID class and one's ID practices.

Interrogation

Interrogation means asking critical questions about technology and its role in education. Although one may immediately assume we are referencing critical approaches to technology

(e.g., Feenberg, 2008; Selwyn, 2015), which are indeed one approach to this particular practice, we would like to invoke some important historical underpinnings in IDT. Davies (1978) argued that part of the shape of this new field called IDT should include contemplation on the implications of technology for education, observing that new technologies were not simply about considering the means but raised questions about the nature of desired ends and outcomes. Technology is not an answer to a question; it raises questions, and part of what it means to be a professional according to early figures in IDT (Davies, 1978; Kaufman et al., 1969; Finn, 1953, 1962 – all reprinted in Ely & Plomp's [1996] Classic Writing in Instructional Technology) is a commitment to asking those critical questions.

One robust framework for this has been developed by Krutka, Heath, and colleagues (e.g., Heath et al., 2023; Krutka et al., 2019; Krutka et al., 2020), which they call "Civics of Technology," drawing upon a technoskeptical approach. They developed a "technoethical audit" or "technoskeptical audit" to support educators in asking critical questions that elicit considerations of technologies and their impacts on society, education, and learners. Although their framework is specifically situated in a K-12 context it can be applied broadly. They similarly developed questions that educators can ask, but these are different from reflective questions. Questions in their technoethical audit include questions about whether the technology was designed ethically and is being used ethically, whether laws that apply to the use of the technology are actually just, whether a given technology affords or constrains democracy and justice, whether and how a developer profits in an ethical way, what unintended or unobvious problems might arise from the technology, and what learning opportunities are afforded or constrained.

Whereas reflective questions are the sorts of questions designers or developers might ask themselves repeatedly through the design process, interrogative or critical questions are typically used as more of a front-end analysis or process of critique. In addition to asking some critical questions of technologies, such as those in the technoethical audit developed by Heath, Krutka and colleagues, there are some other interesting tools that designers are starting to theorize and test that appear to be helpful to interrogation while also being supportive of the design process. For example, Svihla & Kachelmeier (2022) has proposed a design strategy called Wrong Theory Protocol (WTP) in which designers start their brainstorming of possible solutions by imaging harmful or embarrassing solutions. This process of thinking through harmful or humiliating possibilities evokes empathy in designers and generally leads to ideas that are both more empathetic and more creative solutions than those generated by designers who do not use WTP. Other designers have been exploring the use of speculative design or critical design as ways to use design as a way to question potential futures and imagine alternative future scenarios (Dunne & Raby, 2013). A similar sort of strategy, called futurisms, is a strategy for imagining situations such that it may challenge assumptions and inspire transformative ideation characterized by radical hope (Winchester, 2018). Some examples are described in more detail in the section summarizing key practices.

Design

Whitbeck (1996), an engineer who studied ethics in engineering design, introduced the notion of "ethics as design." Because most people think about ethics as a set of statements of moral beliefs, values, or commitments, it may be hard to conceptualize at first what Whitbeck means by ethics as design. It can be helpful to start by thinking of ethical issues and problems as having a lot in common with design problems: they usually are very complex and rarely can be solved simply by selecting option a or b. And ethical problems are often very practical problems that designers and practitioners confront in the course of their work. Because they are not simple problems with simple solutions, they often require creative problem solving by which designers and decision makers devise possible solutions and make choices about trade-offs and what to prioritize or how to balance two or more competing considerations.

Consider for example how the two seeming goods of transparency and confidentiality conflict with each other as an organizational / system design issue that arises frequently. These two values or principles create a tension that a designer or team may be confronted with addressing. Transparency certainly seems good in terms of facilitating honesty and trust, but too much transparency can create situations where individual confidentiality may be violated, thereby eroding trust and safety. Conversely, too much confidentiality may create conditions for doubt and secrecy and erode a culture of trust and transparency. There is no simple solution to this organizational design challenge, as absolute transparency and absolute confidentiality both create a host of issues. Balancing these two will require a design approach of devising possible solutions to then determine the preferred solution (as opposed to the perfect solution). How these are balanced will depend on the organization, its culture, and the individuals involved.

Whitbeck (1996) gives the example of safety in engineering design to illuminate ethics as design. In engineering design, safety is a design specification or parameter alongside the other design specs, and it interacts with the other design specs as well throughout the design process. Engineers designing a seat for children to sit in during flights, for example, must consider variables such as weight and size along with safety and materials options. Safety considerations influence materials considerations, for example, but may be constrained by weight and size requirements. Using design as the process for problem solving, engineers devise possible solutions and test them to arrive at preferred or optimized solutions. One can also readily envision how this process doesn't stop after one design is selected, but the engineering and design of child safety seats evolves over time as new materials, processes, and other improvements support iterations on the design over time.

Ethics as design highlights how ethics are not purely about philosophical principles or even as a form of judgment or evaluation (e.g., for declaring something as ethical or unethical) but instead are a form of design where synthesis is essential in addition to analysis.

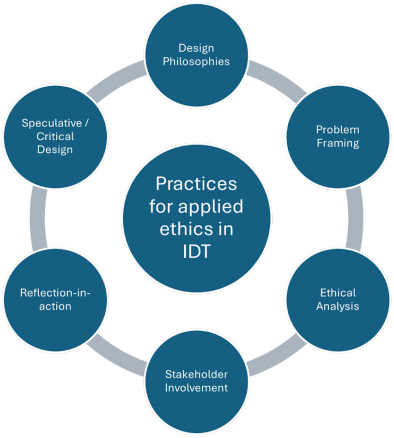
Key Practices for Ethics in Design

Drawing from an extensive literature review and many examples reflected in design cases and design scholarship, we identified or developed the following 6 key practices that

practitioners use to embed ethics in practice that embody reflection, interrogation, and design (Figure 1). Our review and summary also heavily draws on the work by Gray & Boling (2016) on how designers inscribe values into design. We see many of those same strategies reflected in the literature and design cases we reviewed, as well as some additional strategies such as stakeholder involvement and the emerging suite of speculative / critical design strategies.

Figure 1

Practices for embedded ethics



Design Philosophies: Gray & Boling (2016) observed that designers who integrate ethics into their work often explicitly articulate a commitment to particular principles, such as accessibility or equity, or ethical orientation (such as care ethics) at the start of a design project as part of their central design philosophy. Designers – working as individuals or with a team – can explicitly articulate an individual or shared design philosophy that includes statements of values, priorities, and commitments.

Problem Framing: Svihla (2020) defines problem framing as the process by which a professional "take(s) ownership of and iteratively define(s) what the problem really is, decide(s) what should be included and excluded, and decide(s) how to proceed in solving it" (2020, para. 2). She explains that because this is a process of taking ownership of a problem, designers can differently frame what seems like the same problem, and as a result they produce different solutions. She also described "framing agency" as something that a designer can enact as well as something that can be shared with others (e.g. through stakeholder involvement). For embedding ethics in practice, designers will often intentionally frame ethical considerations into the problem they are working on. For example, one may define an assessment problem not only as a need to assess learning but also as a design challenge that includes considerations of equity and accessibility. In this sense, ethical considerations become framed into the problem that a designer or team is working on.

Ethical Analysis: In discussing professional ethics for AI and emerging technologies, Moore et al. (2024) proposed ethical analysis as a front-end tool that can help to frame potential benefits and potential harms as design specifications or constraints. This draws on the work of Whitbeck (1996), who described how she taught ethics for engineering students by having

them identify ethical considerations (e.g. safety, security, accessibility) became design parameters and specifications that then shaped the possible solutions that they derived. Moore and colleagues (2024) suggested creating a map of potential benefits and potential harms to map constraints and specifications, then articulating desired outcomes alongside learning outcomes as part of the front-end analysis and planning process. Especially since instructional design problems are situated in societal and often in organizational contexts, strategies such as *polarity mapping* (Johnson, 1993) can help expose tensions and make visible juxtaposed considerations that requires decisions on trade-offs in the design process.

Stakeholder Involvement: Involving those who will be most impacted by a technology or design has been central in the change and systems thinking literature in IDT for a long time. One may think of ethics as re-centering this essential practice of working with learners and others impacted by instructional designs and technologies. Many other design disciplines treat stakeholder involvement as the central activity that ensures a human-centric approach (see for example Stickdorn et al., 2018, on service design). Participatory design and design-based research frameworks and methods emphasize facilitating stakeholder input throughout the entirety of a design project and can be useful process and methods for centering learners and users as human beings whose learning, work, and lives are impacted by our designs and technological choices. These can be resource-intensive processes, however, so not always feasible. Thus, other strategies that facilitate deep understanding of learner needs - such as the use of personas - can be useful as well.

Reflection-in-action: Ingraham & Boyd (2020) exemplified reflection-in-action and a design philosophy that centered ethics in describing their design process. They adopted a critical approach to their work on designing and developing virtual worlds and simulations, articulating a guiding question for their work on how to best support social justice for learners. They identified three specific ethical issues in virtual world and simulation design centered around principles of justice, equity and diversity: whitewashing / normalizing whiteness, racial stereotyping, and digital blackface. They then devised three reflective questions that they asked themselves throughout their brainstorming, storyboarding, and prototyping processes: does this design include people of color, do those characters reflect any racial stereotypes, and who is performing that character? At each step, their use of these reflective questions centered around ethical considerations led to revisions. For reflection-in-action, designers can develop a set of specific questions around ethical considerations they want to tend to and use those to explicitly reflect on their design throughout the design process. In Chapters 8 and 9 in our book, we generated multiple examples of reflective questions that designers could ask during different design tasks or decisions making processes. Here are a few examples, mapped in this case to design tasks or phases in Morrison et al. (2019):

- *Needs Analysis:* What are critical instructional needs? And what are critical non-instructional needs, such as health, safety, security, etc.?
- *Learner and Context Analysis:* What are important personal, social, and cultural characteristics that influence my learners as learners? For example, how many of my learners are food- or housing-insecure? How many learners will experience accessibility barriers, and what are those barriers I can anticipate? What types of stress will my learners be experiencing, and how can I adjust plans and expectations

accordingly? How many and who will have difficulty completing work or operating safely if they have to leave campus in a higher education context? What assumptions am I making that I can question about learners living environments to inform my expectations on availability, schedule, willingness to share video, etc.?

- *Strategy Selection:* What strategies can I use that emphasize autonomy and agency for my learners (psychological principle of autonomy support, Deci et al., 2006; Gagné, 2003a, 2003b) rather than denying their agency or failing to help them develop their own agency in decision making?
- *Strategy Selection:* What instructional or assessment strategies should I consider using to provide learners more flexibility in how they learn or how they demonstrate their learning?
- *Technology Selection:* Will any of the technologies I've selected introduce access or accessibility barriers for learners? If so, how can I remove or reduce those barriers by changing my choices, changing my use, or introducing alternatives?
- *Technology Selection:* How affordable is this solution? Is there a way I could lessen or remove any possible digital divides through different choices?
- *Technology Selection:* Are learners empowered to choose what information is collected on them and what happens with that data? How might evaluation or procurement processes be leveraged to better support learners' data rights and privacy?

Critical / Speculative Design, Wrong Theory Protocol (WTP) and Futurisms: During an ethics in design showcase at the OTESSA 2024 convention Ferris and colleagues (2024) and Wilson-Fetrow (2024) presented on their design projects where they employed speculative design, futurisms, and WTP in design projects where the teams had identified diversity, equity, inclusion, and justice as priority considerations. In that same exhibit, Sutherland (2024) used critical design (Dunne & Raby, 2024) and speculative design as strategies to foreground social issues in design – in this case, specifically environmental considerations – and explore possible alternatives that drew on principles of openness and sustainability. Technoethical audits, speculative design, critical design, WTP, and futurisms are an intriguing emerging set of strategies that can facilitate interrogation and readily be integrated into instructional design processes, practices, and classes.

Table 1

Strategies for Embedding Ethics in ID and EdTech Decision Making

Design Philosophies: Articulate an individual or shared design philosophy that includes statements of values, priorities, and commitments.

Problem Framing: Draft a problem statement for a current design effort and revise it – individually or in a group – to frame ethical considerations into the problem; devise a central question.

Ethical Analysis: As part of front-end analysis, identify both potential benefits and potential harms; create a table or chart that can then be used to inform possible solutions or approaches.

Stakeholder Involvement: Facilitate stakeholder input throughout the entirety of a design project; participatory design can be a useful design framework to center learners and other stakeholders.

Reflection-in-action: Develop a set of specific questions you can use to reflect on priority ethical considerations throughout all phases of design.

Wrong Theory Protocol: Generate harmful or humiliating solutions first *then* generate actual ideas.

Technoethical Audit: Use the questions developed by Krutka, Heath and colleagues to conduct an audit of a technology you are considering adopting or implementing.

Speculative / Critical Design: Imagine possible (good and bad) or desirable alternative futures for a system or community in relation to a technology; use a vision of the future or the awareness of possible harms or social issues to then inform current design / decision making. Additional strategies include:

Infusing Ethics into Teaching Introduction to Instructional Design

With these common strategies from design practice in the wild in mind, let's now explore integrating ethics into design models and a typical introductory class on instructional design along with other examples of ethics infused in IDT classes, curricula and practice.

Introduction to Instructional Design is a foundational course in many Instructional Technology and Educational Technology programs. Introduction to Instructional Design typically provides an overview of the instructional design process, using one ID model as a framework throughout the course, as learners work through an instructional design problem. A typical introductory course will require learners to develop an instructional design planning document, either in a team or individually. In our collective 40-plus years of teaching instructional design for various institutions, we have seen additional topics layered into the core concepts of working through an instructional design process, such as broad issues in practice reflected in readings from Trends and Issues in Instructional Design (Rieser et al., 2024) or career exploration to introduce learners to opportunities, roles, and different industries. One obvious gap over the years, however, has been explicit incorporation of ethical considerations into instructional design practices, especially as anything other than supplemental topics throughout the course.

Some topics, such as accessibility and copyright, do receive passing mention in some design models. However, Moore (2021) and Rieber and Estes (2017) highlighted how even those limited instances are often problematic. For example, only one ethical issue – accessibility – is mentioned in Morrison et al. (2019), and only five sentences are devoted to this, amounting to a suggestion that students with physical disabilities should be referred to specialists. Rieber and Estes (2017) looked at the Dick et al. (2009) model and noted only

passing mention of compliance with the Americans with Disabilities Act (ADA), representing more of a legal approach than and ethics approach. Ethics and law have routinely been confounded with each other as well, with copyright and accessibility being treated primarily as a matter of compliance with rules and the law, not as ethical principles or commitments that require problem solving. Moore (2021) noted that, despite the centrality of ethics in the definition of the field, ethical commitments articulated in the AECT Code of Professional Ethics (2020) - such as protecting "individual rights of access to materials" (Section 3.1.2), making "reasonable efforts to protect individuals from conditions harmful to health and safety" (Section 3.1.6), and "seek to avoid content that reinforces or promotes gender, ethnic, racial, or religious stereotypes" (Section 3.1.8) – are not discussed in any design models, nor do most treatments of ethics reflect that ethics are distinct from legal considerations and compliance.

Still, ethics and professional standards should be a core concern through every part of instructional design practice. We argue that ethical considerations simply are features of the problems and projects we work on, whether we acknowledge and tend to them or not. Many potential professionals entering the field are unclear or unaware about what instructional design is when they first enroll in a course or program, and from their introduction to the field and its processes and practice, those teaching ID classes significantly frame and shape new professionals' understanding of the field. Often there is an assumption that instructional design means that a learner is going learn how to build a course, which shapes expectations that learning ID means assembling materials in a course site or something of that nature. When learners discover that there is a good deal of analysis, they have a variety of reactions. Some learners are intrigued and want to learn more. Others feel like it's a waste of time, unrealistic given demands and deadlines in an employment setting, and not the "fun" design work they were envisioning.

Student expectations when enrolling in Instructional Design are immediately relevant to the topic of this chapter because by infusing a sense of professional ethics into the Intro to ID curriculum from the start, we can lay the foundation not just of the importance of the big picture of the design process but also of the field and shape expectations around the nature of professional work in IDT.

It is important to note that incorporating ethics can be easily done alongside any instructional design model; it is not model-specific. Although no model in the field offers any integration of ethics, the design activities and phases across models are similar, and all design is conducted in contexts that give rise to ethical considerations such as cultural and social dimensions of the work. In the courses we have taught, we have primarily used ADDIE as part of *Streamlined ID* (Larson & Lockee, 2020) or Morrison et al. (2019) to guide learners through the application of the instructional design process to their own instructional design problem. In the ethics book, we used the Morrison et al. (2019) model as an organizer for exploring ethics integrated into different activities and phases of design. For this chapter, we will discuss a specific example of how Heather wove ideas from our book into a recent ID class where she used the ADDIE model as represented in the text *Streamlined ID* (Larson & Lockee, 2020). Section headers of this chapter tend to map to the *Streamlined ID* text.

If you are an instructor considering how to incorporate ethics into your ID course, our most critical advice is that it does not have to require adding lots of additional work and readings.

And some of these you may prefer to weave into an introductory course and others into an advanced ID course. The adjustments made to the Intro to ID course were references woven throughout content and assignments, but did not incorporate extensive readings. It was presented as an intentional framing. Often times, incorporating ethics can occur through subtle reframing of certain concepts, the addition of another prompt in a reflection, or incorporation of some additional resources focused on related topics. The idea of "light layers" can work very well for interleaving ethics into ID. The following is written from Heather's perspective and therefore in her voice. If you are a practitioner reading this, the very same reflective questions, audits or analyses, and activities can be integrated right into your ID practice.

Setting the Stage: Instructional Designers as Reflective Practitioners

In an introductory course, we're starting from the very foundation of the field. There are several introductory texts possible to support the instructional experience, and for the purposes of this example, we'll follow along with Streamlined ID by Larson and Lockee (2020) In the Streamlined ID text, Chapter 1 sets the stage with "the iterative design process." This is a natural opportunity to weave in the concept of designers as reflective practitioners. This concept can be woven through the content of the course. A module section each week can highlight a few considerations related to being a reflective practitioner for their consideration. Therefore, as a first step in framing the experience, I used the framing of preparing to be a reflective practitioner to guide learners' work in the course.

For the introductory module to the course, the reflective practitioner was introduced as a key concept that would flow throughout the course:

> *In this course we use Streamlined ID, which is sort of instructional-design-model agnostic. In other words, we're using the generic ADDIE model, but there are many ID models with varying levels of detail. I'll be incorporating additional topics throughout the course on the topic of being a reflective practitioner. In essence, it is considerations of how to bring ethical considerations into instructional design practice, which will be useful to anyone working or considering working in providing learning experiences—from design through delivery.*
>
> *One key concept at the start of the class, where we are thinking about opportunities for selecting a project, is the idea of* ***Ethics as Design****. Even this comparison allows us to think about what design really is—the opportunity to analyze a problem—in the case of instructional design—an instructional problem and generate possible solutions. There will not be ONE correct solution. Every step of the way, we're analyzing to decide—the best course of action, the best method to deliver instruction. We're doing this by trying to understand what will work best for our learners, in the context they work in, given the performance objectives they need to make.*

> *It can be bigger than that, though too. In choosing the instructional problems we want to work on (especially in the context of a course), we have the ability to prioritize one instructional problem over another—to choose what we work on that we think will deliver the most value.*
>
> *There are other considerations and topics too that relate to reflective practice as instructional designers. Obvious ones are accessibility, copyright, student data privacy, and student access to hardware, software or internet. There are emerging topics that designers will want to be well-informed about, such as how to design learning in a world with increasingly widespread access to robust generative AI. Relatedly, how do designers use generative AI in their own practice in ways that feel transparent and appropriate. The range of knowledge is always going to be shifting and requiring thoughtful analysis--which will be the tools we are developing in this course to tackle both current and emerging considerations when designing learning.*

The goal at this point is to have learners understand the larger picture of instructional design and that the projects that we choose to work on are also a reflection of our values. This message can be difficult to fully convey, as many designers or those who would like to enter the field may not be thinking of their role from the viewpoint that they have a choice of how to influence the problems that are deemed valuable enough to solve with instructional design.

While the framing content presents this idea, the most impactful work will be asking learners to apply this concept to their own thinking about how they might engage in the field, which occurs through reflection assignments. Using an approach that pedagogically employs Schön's (1983) idea of the reflective practitioner, I use reflection assignments to book-end my graduate courses. I generally incorporate learner reflections to frame out the course with a beginning, middle and end check-in with learners on their thinking about their goals for the course. Instructional design graduate students are typically adult learners with specific goals and one of the rich aspects of the field is that those studying instructional design come from varied disciplines such as business, education, healthcare. The reflection assignment is a perfect opportunity to ask learners to document their goals for the course. This serves to both engage them metacognitively, and also as the instructor, to ensure I'm providing resources and feedback that support their goal. With this intentional focus on ethics in design and being a reflective practitioner, I added a mid-point reflection to ensure there is an additional opportunity for their guided thoughts on instructional design and ethical practice. And at the end of the course, the final reflection offers a space for learners to report back on their sense of progress towards their own goals.

Because I already was using an introductory and concluding reflection, simple adjustments to the reflection questions allowed for the space to incorporate a focus on ethical, reflective practice immediately. For instructors using this same approach, adding an additional prompt to any reflection assignments asking learners to relay their thoughts on what is entailed is being a reflective practitioner can seamlessly incorporate this concept. For the Introduction to Instructional Design course, the original assignment asked them to identify several goals for the course to guide their own learning. I adjusted the prompt to have them identify one goal related to instructional design and one to their design philosophy "the values, priorities,

and ethical considerations" they want to incorporate into their instructional design practice. Similarly the final reflection was modified to include the same:

> *Revisit your initial learning goals from the beginning of the class. Again, write about two-three paragraphs following up on your first reflection in the course.*
>
> - *How has your understanding of the field of instructional design been impacted through your work in this course?*
> - *What have you learned regarding ethical considerations in the field of ID? How would you envision applying them to your work as an educator and designer? In terms of your goals: What did you think you wanted to learn? Did your experience in this class help you attain your learning goals?*
> - *How will you apply skills you have learned in this course to your work experience?*

Ideas for an Introductory Module / Week 1 are Summarized in Table 2.

Table 2

Ethics in an introductory module / Week 1

Framing	Additional Reading
Woven into the introduction: "I'll be incorporating additional topics throughout the course on the topic of being a reflective practitioner. This will include bringing ethical considerations into instructional design practice …"	Moore, S. (2021). The design models we have are not the design models we need. *The Journal of Applied Instructional Design, 10*(4). https://dx.doi.org/10.59668/329.5266

Setting the Stage: What Does Amazing Instructional Design Look Like

The next area where learners would benefit from additional insight into what it means to be a reflective practitioner would be through exemplars of instructional design. Ethical instructional design ensures that the desired learning outcomes are aligned with a performance problem that can be improved with training. Those outcomes are described with clear assessment criteria and opportunities to practice and receive feedback on the path to achieving those outcomes should be provided. The expected result is that someone experiencing instruction or training attains skills and knowledge that will help them be effective in their expected performance context. Yes, this is the core essence of instructional design, and failure to deliver on this would be an ethical problem. Here, we are still in Chapter 1 of *Streamlined ID*, with its section on "Effective Learning Experiences." It is never too soon to mention in the course the importance of alignment. Learners in an introductory course who have a background in education are often familiar with backwards design, which is also a helpful framework to introduce early in the course. It can be beneficial to think of how to actually show the ethical responsibility of designers to create clear alignment in their projects In the early stages of the course, however, its also important to note that true beginners to the field are not likely to fully grasp what this means beyond a surface level.

Amazing design starts with alignment in that there is a performance problem—and the training needs to address the performance gap. Failure to calibrate this correctly may waste resources – both time and money. Worse, it doesn't solve the problem that the designer has been brought in to solve. For the training to address the performance gap, the ID must develop clear and measurable objectives, aligned with the instructional need, and then clearly define the assessment criteria. From there, the designer needs to ensure that the learning activities prepare learners for that assessment criteria—and all of this, while being hopefully fairly obvious when learners hear it described, is much more challenging to do in practice. The aspect of this that designers need to hear

Pedagogical approaches engage learners and allow them to participate in a way that allows learners to practice and receive feedback on skills, knowledge or attitudes that are described in learning outcomes. Those opportunities for practice and feedback should be available before any summative assessment to ensure that there is an actual opportunity for learning.

Amazing instructional design also tells a story and allows learners to engage in perspective-taking and critical thinking/problem-solving—even when the performance problem appears to be a simple matter of learning to use a new technology. Technology is constantly changing, so if learners in the course are tasked with designing a training on technology needs, it is important to empower learners to design around not just what "buttons" to press to use an application, but fundamental conceptual knowledge of what the application is for and how to troubleshoot through its functional use. Choosing exemplars that include discussion of ethical issues and how they were navigated can model for students how to navigate ethical dimensions of ID projects that do not have neat solutions. One way to do this is by integrating in design cases that include ethical considerations. This can occur with any of the analysis content early in the course. In the course I teach, early on there are case

studies in the weekly discussions. The Learner Analysis in particular is one where there is a jigsaw assignment, with three different cases set in different industries that describe the work of a designer with projects that may or may not be set up for success. While redesigning to incorporate ethical considerations, some simple adjustments to the reflection questions helped set the stage for reinforcing the ethical considerations of ID.

For example, with the the first case, I modified the first reflection prompt according:

- *In what ways does the ID engage as a reflective practitioner of ID? What gaps do you see in her approach to design that she could improve in the next project?*
- *What other stakeholders would you have consulted for the project, and how would you have involved those individuals or groups in the design process?*
- *What tasks and responsibilities related to learner analysis were addressed, and should have been addressed early in the process?*
- *Remembering the discussion on systems from Chapter 1, what systems impacted or should have impacted the design of the instructional module on Internet safety?*

- *What differing characteristics and needs were likely present in the learner population that were not considered in the design?*

Choosing exemplars that include discussion of ethical issues and how they were navigated can model for students how to navigate ethical dimensions of ID projects that do not have neat solutions. One way to do this is by integrating in design cases that include ethical considerations. When using such exemplars, it is important to explicitly point these features out to students to draw their attention to these aspects (as with other aspects). You may also want to consider crafting an online or in-class discussion that prompts students to identify the ethical issues the designers wrestled with, how they chose to resolve the issues through their design, and further discuss how a resolution is not the same as a perfect textbook answer. In Table 3, we summarize some ideas for a week that covers “what does amazing design look like.”

Table 3.

What does amazing design look like: Exemplars that include ethical tensions

Framing	Additional Readings	Possible Discussion / Activities
Exemplary work includes work where designers are navigating difficult or complicated issues or even disagreements	Some possible design cases: • Gallup et al. (2018), Empowerment and constraint: Design of a homecare worker training program. *International Journal of Designs for Learning*. https://doi.org/10.14434/ijdl.v9i1.23459	**Discussion:** What were some of the ethical tensions the designers discuss? How did they negotiate these with the team, and what

Framing	Additional Readings	Possible Discussion / Activities
between the values and interests of different stakeholder groups. Designers not only bring their own values and interests to a project, but they often must work with a team to negotiate differing perspectives.	• Steele et al. (2018), Accessible making: Designing a makerspace for accessibility. *International Journal of Designs for Learning.* https://doi.org/10.14434/ijdl.v9i1.22648 • Litts et al. (2024), The design ethics of culturally sustaining / revitalizing (re)presentation. *International Journal of Designs for Learning* (link forthcoming)	design decisions resulted from these negotiations? **Activity:** Identifying Ethical Considerations, Articulating a Design Philosophy – In the project you are working on for this class, what are some of the ethical considerations present in your project? If you were to summarize your design philosophy for the project (as an individual or a team), what would it be? Include any statements of shared values, priorities, and commitments.

Identifying the Instructional Problem – Problem Framing and Needs Analysis

One of the biggest challenges in an introductory instructional design course is identifying an appropriate instructional design project for learners to engage in during the course. While this may feel similar to selecting a project in a real setting, there are unique challenges in quickly and accurately diagnosing a potential instructional problem that can improve performance through training. Close after that is identifying the right scope of project that will result in a true instructional design training. I always want to guide learners to think more openly about their project ideas, but there also isn't a lot of time for selecting the right problem to solve because we also want to make sure there is enough time to all the stages of the design project.

While this may feel similar to selecting a project in a real-world setting, learners face unique challenges in quickly and accurately diagnosing an instructional problem that can be addressed effectively through training. Compounding this is the need to identify a project scope that will lead to a complete instructional design solution. I always encourage learners to think broadly about potential project ideas, but there's also limited time to select the right problem to solve, since we need to ensure there's adequate time to complete each stage of the design process.

This is where problem framing can be a powerful tool and important skill for reflective designers. Learning to look at a problem from multiple perspectives and to analyze possible approaches to the problem can generate more impactful solutions. Before my course revisions to incorporate a more reflective approach, I had learners brainstorm ideas for their instructional design project and look to form groups around topics of interest. In my course revision, I asked ID students to identify a problem along with two initial framings of the problem. This allowed more space and thoughtfulness around what instructional problem learners might partner together on during the course.

For guidance on how to incorporate problem framing, I provided the following context:

> *As we explore what instructional designers do, a good part of the responsibility of IDs is problem solving and analysis.*
>
> *Many times, someone will come to an instructional designer with a problem that they want solved, and it is critical for a designer to fully gather information, data, and reflect on what we are being told is the problem to look at what multiple perspectives and data inform us might be a fuller understanding of the problem.*
>
> *In turn, it's important to create some boundaries around the problem we're solving (in project management terms, that might be a bit like project scope). We also might need to get feedback on the priorities for instruction--because sometimes very large problems will require a multi-faceted approach. And in future modules of the course, we'll talk about solutions that aren't training, and how it is important to determine if a particular problem can even be solved by training. In addition, often trainings need support of much larger organizational initiatives-- management support and change management approaches, for example.*
>
> *In the article, Svihla provides this example of how one design problem can be framed in two different ways and produce two different design solutions:*

> *In your ideation on potential instructional problems for your final project, I'm going to ask you to generate two different framings for the instructional problem you are considering for the course. In my opinion, this graphic is simplistic for a lot of design scenarios where we're going to have a lot more information than just--leaders need leadership training. And, if that's all we have, we would need to collect quite a bit more information to arrive at whether our stakeholders think framing #1 or #2 is more on target. However, for our purposes this is a perfect exercise because for our project we may just have a high-level idea, and generating multiple frames to tackling the problem can help keep our perspective open as we begin our analysis in these next few weeks.*

Table 4 summarizes ideas for integrating ethics into weeks that address problem framing and needs analysis. Problem framing may be a new concept to integrating for some in their ID classes, so resources on problem framing generally are included as well.

Table 4

Integrating ethics through problem framing and needs analysis

Framing Activity	Additional Readings
We solve the problems that we frame. Are there important ethical considerations that are part of the problem that you're working on? Are there needs – such as safety, health and well-being, security, or accessibility – that are essential to the instruction you're designing? For example, if you're designing a workout routine for student athletes or casual health practices, should safety (e.g. preventing heat exhaustion or injury) be central alongside learning goals?	Svihla, V. (2021). Problem Framing. *Design for Learning: Principles, Processes, and Praxis*.https://edtechbooks.org/id/problem_framing Moore & Tillberg-Webb (2023), Ethics & Ed Tech Ch. 3 – The Designer's Presence (covers problem framing and ethics) Stefaniak, J. E. (2021). Conducting Needs Assessments to Inform Instructional Design Practices and Decisions. *A Practitioner's Guide to Instructional Design in Higher Education*. https://doi.org/10.59668/164.4543

Fostering Reflective Practice Through Structured Collaboration

A common pedagogical strategy in graduate-level instructional design courses is to have learners work together in groups. This approach simulates the professional environment where designers collaborate with subject matter experts (SMEs), technologists, and project managers to create effective learning solutions. However, a challenge in course-based group projects is ensuring that learners are set up for success. While group work in a course setting mirrors the collaborative nature of instructional design teams, it's critical to recognize that learners may not have the same motivations, responsibilities, or levels of accountability as professional teams working on real-world projects (even as much as we encourage the course projects to be rooted in real world world opportunities!).

Even if the instructional needs identified by learners resemble authentic scenarios, students often have varying degrees of access to target audiences, realistic contexts, and subject matter expertise. To support effective collaboration and smooth communication, incorporating group contracts can be a powerful strategy. These contracts clearly define roles and responsibilities, outline communication protocols, and establish decision-making processes. Engaging learners in a structured discussion about these elements at the start helps set expectations and provides a foundation for navigating potential conflicts.

Framing this process as part of the professional expectations of a reflective practitioner is key. It underscores the importance of clear communication, commitment to shared goals, constructive negotiation of disagreements, and the use of external evidence to support decision-making within the group.

Using group contracts serves a dual purpose: it not only models professional practices for reflective practitioners but also sets teams up for successful collaboration, both in academic settings and in their future professional environments.

Front-End Analysis: Rethinking the Learner Analysis

One of the first major data collection points for learners in the course is the learner analysis. The primary goal is to understand who the target learners are and what they need. The Learner analysis in traditional ID models limits this analysis to broad categories like prior knowledge, demographics, and generalized learner characteristics. However, integrating Universal Design for Learning (UDL) and design thinking strategies such as learner personas offers a richer, more dynamic approach by combining empathy with systematic flexibility to better address individual needs. There are also growing examples of developing personas as part of instructional design practice (Baaki & Maddrell, 2020; Schmidt & Tawfik, 2022; She et al. , 2022; Yang, 2023) We would tend to find these in a textbook more associated with design theory (which is where we find an orientation to these two concepts in Streamlined ID (Lockee & Larson, 2019, p. 157).

Universal Design for Learning encourages designers to take a proactive approach by considering the why, what, and how of learning, which translates into principles of representation, action & expression, and engagement. By aligning the design process around these three pillars, we can create learning experiences that anticipate variability and respond to a wider range of learner preferences and abilities. Incorporating UDL early in the design

process aligns well with backward design principles, ensuring that learner needs shape the instruction. Table 6.12 in Streamlined ID (Lockee & Larson, 2019, p. 166) also has a nicely detailed checklist for walking through considerations for UDL in instruction. However, this checklist seems best suited for planning/evaluating the details of instruction once a content analysis has been completed.

When strategizing how best to understand learners' needs, design thinking (Brown, 2008; Brown & Wyatt 2010) is helpful to bring in alongside conventional ID models. Design thinking starts with the premise of identifying a problem for a user and empathizing with the user to understand their point of view. Although the design problem in an ID context needs to be narrowed to a training or learning opportunity, the emphasis on empathizing with the learner to understand their point of view positions an ID to fully understand the target learners' needs. Design thinking encourages the use of learner personas, which serve as narrative profiles representing key learner groups. Personas help instructional designers step into the learners' shoes to explore their motivations, challenges, and learning contexts. Together, UDL and learner personas offer a pathway to designing instruction that is both inclusive and personalized.

For instance, a persona may highlight a learner who struggles with visual content but excels in verbal processing. Using the UDL framework, we can design multiple modes of representation (e.g., text-to-speech options, verbal explanations) to support this learner, ensuring they have equitable access to the material. Meanwhile, considering the persona's motivational drivers—such as their interest in real-world problem-solving—we can tailor engagement strategies that resonate more effectively, further bridging the gap between content and learner needs. This alignment between learner personas and design thinking offers a shift from the more analytical, conventional stance championed by traditional ID models, focusing instead on creating empathetic, learner-centered solutions. Personas can allow us to understand major trends in the populations we are serving in order to craft cogent UDL approaches for these identified profiles.

These target learners may have differing learner states, such as prior knowledge, metacognitive awareness, reading ability, visuospatial abilities and they may have differing learning processes, as capacity for change, situational capacity, and interest in the task or context of the work (Moore and Tillberg-Webb, 2023, p. 167).

The integration of UDL and learner personas transforms the traditional learner analysis, moving beyond static lists of attributes to dynamic narratives that guide instructional decisions. Instead of merely cataloging demographics or prior knowledge, we gain a more comprehensive view of who our learners are and why they might engage or disengage with the content. This nuanced understanding equips us to create instructional solutions that are flexible, supportive, and deeply aligned with learners' real-world contexts.

With each of these additional design approaches, it becomes evident that the conventional learner analysis format of a table with standard characteristics is a bit limited. I've adjusted the learner analysis requirements to include both traditional data points on target learners and learner personas.

The adjustment to my instruction for learners was relatively simple in the learner analysis section, with this set of questions representing incorporation of the UDL principles of

representation (why), action & expression (what) & engagement (how):

> *To gather data for the learner analysis:*
>
> - *What sources of information about your learners does your design team already have access to?*
> - *What questions will you ask your prospective audience to best understand what motivates them in their job, in completing training (the **Why of Learning**)?*
> - *How will you ensure that you're considering a broad group of stakeholders and not missing key perspectives (the **What of Learning**)?*
> - *How will you elicit understanding of the type of assessment that will best allow your audience to represent their skills (the **How of Learning**)?*

Shifting from conventional learner analysis formats to using learner personas helps bridge the gap between theoretical models and practical design by making the learner the focal point of every decision. Incorporating UDL principles as a foundational lens ensures that each persona's needs are met through varied means of engagement, representation, and assessment—ultimately leading to a more inclusive and impactful learning experience.

I haven't been fully comfortable moving away from a conventional learner analysis, but for the most recent round of projects, I have included the requirement of adding 1-3 learner personas and draft a quick bio for each along with goals, motivations, and frustrations.

Front-End Analysis: Context Analysis

After guiding our instructional design learners through the identification of the instructional problem and orienting them to considering their target learners, we next engage them in thinking about the context. In their seminal exploration of the role of context in the instructional design (ID) process, Tessemer and Richey (1997) defined context as "a multilevel body of factors in which learning and performance are embedded" (p.87). Contextual analysis is included in many models as part of the ID process and is defined, for example, by Morrison et al. (2019) as "a collection of factors that can inhibit or facilitate instruction and learning" (p. 61). Often this results in context being defined as the context in which any learning will be applied or practiced – an accurate but also limited definition of context. While contextual analysis is featured as a standard activity within popular ID texts, treatment remains focused on three dimensions of context: *orienting context* (what context do learners bring to the instruction), *instructional context* (where does the instruction take place), and *transfer context* (what is the context like in which learners will be applying their learning) (Morrison et al., 2019; Tessemer & Richey, 1997). These are sometimes also labeled cultural context, learning context and performance context respectively.

Ethical considerations most often relate directly to *orienting context* - which can be updated to include culture, accessibility needs, and other aspects of learners' orienting context - and *instructional (learning) context*. Digital equity and digital divide issues, for example, speak to what learners have access to outside of the learning or instructional context and how access and infrastructure – or lack thereof – impact learners in a myriad of ways

(Ritzhaupt et al., 2020; Warschauer, 2002, 2003). In some ways, the digital divide has been a long-standing example of an ethical issue reflected in the influence of context on learning design and technology choices. Yet even this well-established issue has yet to make its way into the fabric of ID processes and models. In elaborating on instructional design for emergency contexts, Hodges et al. (2021) specifically recommended expanding definitions of contextual analysis to ask questions (listed below) about the orienting context focusing in particular on infrastructure as an indicator of possible digital divides:

- What infrastructure will learners have access to through the school?
- What infrastructure do learners have access to in the community? For example, do you know what is available through local libraries and other public or private spaces?
- What is the status of internet connectivity and availability in your local neighborhoods and district? What is the status of mobile access and networks in your local neighborhoods and districts?
- What are other available education and communications infrastructures? For example, is there a local public radio or television station that could serve as a potential partner, especially during disruptions?
- What are backup systems and infrastructure to consider as alternatives in case of disruptions? If mobile is more reliable, how can your plan incorporate mobile flexibility from the beginning?

By expanding our conception of context to include socio-cultural features, we can incorporate considerations of ethical principles such as equity and accessibility into contextual analysis (Heath & Moore, in press). In an ID class, during the context analysis phase, prompts like the questions from Hodges et al. (2021) in a job aid to learners could be beneficial to include. If there is time or room for an assignment, we could ask students to generate questions on socio-cultural considerations they should consider as important aspects of their learners' contexts. Some of these occur naturally early on in the course when learners are identifying their goals around ethical considerations in ID. Lastly, in terms of formally including these socio-cultural considerations into the contextual analysis itself, these can either be prompts for considerations within the cultural considerations section or we can create an additional separate section of the contextual analysis focused on socio-cultural considerations.

Front-end Analysis: Content and Task Analysis

For some reason, content and task analysis routinely is one of the most difficult concepts to convey to those new to instructional design. ID students at this point are excited to get into the design portion of the process, but here we are still squarely in analysis, building a solid understanding of the key considerations with the content to be attained and the procedures (tasks) to be learned. While there are a number of approaches to task analysis, such as content analysis, procedural analysis, cognitive task analysis and many more captured in Jonassen's extensive text on the subject (Jonassen, 1998), after watching students struggle

with which approach to use, I require all learners to consider the facts, procedures and attitudes necessary for success on the performance problem.

One of the most obvious current ethical considerations in education is the use of generative AI in teaching and learning. For all the discussions about AI's impact on education, the most immediate and disruptive change is likely to occur for designers during content development, which has traditionally been rooted in content and task analysis. Generative AI can generate large amounts of content quickly, but it raises significant questions about accuracy and validity. At the same time, with effective prompting, Generative AI can quickly reframe key points into different styles of writing; can generate multiple examples to illustrate a concept; or can generate sample quiz questions and answers. All of this needs to be evaluated and synthesized by a designer and subject matter expert, but the thought partnership of AI tools can springboard brainstorming and content creation. Also, the availability of AI for our target learners requires a shift in how we approach assessment—to ensure we are measuring meaningful learning rather than easily produced outputs.

Given the current shifting landscape around task and content analysis, in my course, I revised the conventional procedural analysis exercise (e.g., Dick et al., 2009's "peanut butter and jelly sandwich" task analysis) to require the use of generative AI, specifically ChatGPT. Previously, I had this as an optional activity, but with no students were opting in, so I made it a requirement. This adjustment forces students to grapple with using AI as a tool while adding their own expertise and value as subject matter experts (SMEs). They must demonstrate the process and critically review the AI-generated content to ensure its accuracy. The assignment centers on tasks students are deeply familiar with so they can effectively evaluate AI outputs against their own expertise.

To further support this, I've incorporated readings on effective prompt generation for AI and strategies for mitigating data privacy risks when using generative AI tools. Prompt generation will increasingly be a critical skill for professionals in many fields, alongside the ability to identify expert sources and vet information generated by artificial intelligence.

This is a great opportunity to also reinforce some reflective practice with learners. So as they work on this, I also add in a reflective prompt for the to pause and articulate some observations:

> *Using generative AI means understanding the nature of the technology of Large Language Models. Keep in mind that it is predicting what it thinks the next word would be; it is NOT a search engine. Pause for a moment to consider – if a generative AI is not a search engine but a language prediction technology, what does that imply about its output?*
>
> *Further, this is a good time to be thinking about the veracity and accuracy of the content. What professional or specific knowledge should an ID have to use a generative AI effectively? Based on that, what might you articulate as a guiding ethical principle for your own use of generative AI in your ID work?*

In taking this approach, I'm trying to cultivate a better understanding of how to use generative AI in support of their development as ID decision makers, evoking an underlying ethos of autonomy support in my instructional approach. I want them to think through their use of this – or any – tool and develop guiding principles for use. While there may be an

inclination to want to police student use of GenAI, the reality is that in the coming years workplaces and professions will expect that professionals are able to creatively *and ethically* use GenAI as a performance tool.

While content and task analysis are the areas that have seemed the most obvious to intentionally include a focused use of Generative AI, I have been having students who want to use generative AI in order to create the learner analysis and learner personas. As more and more usage of AI becomes normalized, the problem will remain of how to validate any analysis generated by AI. It will become even more problematic to reasonably assess these details as an instructor. This presents an opportunity to educate learners about the different types of AI (generative AI being prone to hallucinations which could produce wildly inaccurate content) and the criticality of verifying details and validating with human experts to avoid significant missteps based on erroneous needs analysis. This is an area that will need considerable attention and iteration as the generative AI world continues to develop.

Instructional reflections from Heather on use of GenAI in an ID course

Use of Generative AI in practice is complicated to navigate ethically as a professional and for learners. For example, while I had included this assignment for several terms, as use of AI has gotten more prevalent, I had an ID students using it to craft learner personas, which at the time was not a required part of the learner analysis in the project. It had me asking, why do I feel it's ok for ID students to use it for one part of their writing and not another? Would it bother me if ID students used generative AI for their entire project? I had a student whose final work looked like it had been just churned out by AI and I wasn't sure how to broach it, but it turned out to be easy because the reason it was so concerning is that it was completely mis-aligned from the assignment objectives. Then I started to use ChatGPT myself, at first out of curiosity and then as a sounding-board to try out ideas and get feedback. To think deeply about how parts of my writing are structured in a way that helps me see the main points and flow of ideas. Out of an academic context, I can provide prompts and have a machine reinterpret the same consent in a style or tone that would be emotionally challenging for me to conjure. In all of these cases, it was helpful to try it out myself to have more concrete direction for ID students about what feels like an ethical use of the tool versus what is not an ethical use and also to experience that while it is a very useful tool, if used appropriately it's not a shortcut but a tool for expanding possibilities.

Diving Deeper Into What It Means to be a Reflective Practitioner

Within the course, as we get past the needs analysis, diving deeper into what it means to be a reflective practitioner can provide an opportunity to explore the moral dimensions of being an instructional designer. At the end of the analysis phases, there is a week of synthesis that asks the ID students to pull together their understanding of all the phases of the ID process thus far, and then also continue their reflective process about what it means to them to be a reflective practitioner. This entails describing the "worthwhileness" of the work we do: instruction or training and the technologies we use should be worthwhile to the cause of learning and performance (Davies, 1978). To ensure that this is reinforced throughout the instructional design course, I added new content on the moral dimensions of ID and instructional design, drawing on Osguthorpe et al. (2003):

> *The authors critique instructional design models as producing "mimetic instruction" while calling for instructional designers who are skilled to provide transformational education.*
>
> *In particular, they call on instructional designers to develop in five areas to help ensure that they are thoughtfully engaged in developing instructional solutions that gravitate more toward the transformational. These are:*
>
> - *conscience of craft*
> - *conscience of membership*
> - *conscience of sacrifice*
> - *conscience of memory*
> - *conscience of imagination*
>
> *In summation, they call on designers to develop reflexive thought and judgment.*
>
> *The article is worth a good read, and I'll add why I've added it into this section for your consideration. Instructional design is a profession, with a long history going back at least 100 years-- but rising in prominence in World War 2 when standardized instruction became an important focus. The ultimate challenge for designers is to take --often complex areas of content-- and apply a systematic approach to delivering training that represents the complexity required for learners do to more than generate answers to multiple choice questions.*

Another newer case by McDonald & Costa (2024) article was just published, so I'm considering if this would also be a thought-provoking addition. It's a case study on the interactions of instructional designers with faculty on a design project where the standard ID approach failed to support the clients in this case. Through their analysis, McDonald & Costa do an excellent job illuminating how a "mimetic" or "calculative" approach to ID, as they describe it, can actually be a disservice to clients and learners. It invites some deeper introspection into our practices and habits as designers. Table 5 summarizing some of the framing and additional readings.

Table 5

Framing and readings for diving deeper into what it means to be a reflective practitioner

Framing	Additional Reading
Avoiding "mimetic" or "calculative" instructional design that can wax reductive. Instead, as professionals, we have to be ready to tackle the complexity and approach our work as a craft with moral dimensions.	McDonald, J. & Costa, I. (2024). A critique of calculation and optionalization applied to online / blended course design. *Journal of Computing in Higher Education*. https://link.springer.com/article/10.1007/s12528-024-09409-1 Osguthorpe, R. T., Osguthorpe, R. D., Jacob, W. J., & Davies, R. (2003). The Moral Dimensions of Instructional Design. *Educational Technology, 43*(2), 19–23.

Design and Development: Technology Selection; Multimedia and Materials Selection; and Message Design

During the design and development phases, the critical stages that lend themselves to interrogation and ethical reflection are technology selection, media selection and message design. While ethical considerations should inform the entire learning design process, it is during design and development that these principles are translated into actual content, interactions, and delivery methods that shape the learner experience. Decisions around technology selection come with specific affordances and constraints—features that can either support and enhance learning or, if poorly chosen, detract from it. These choices in turn determine not only how content is represented, but also whether it will be inclusive, accessible, and respectful of diverse learner needs.

If reflective practices have been thoughtfully integrated into the analysis phase, then similar approaches should naturally extend into design—including questioning how messages are structured, communicated, and represented through various technologies and media. This is particularly relevant when considering models such as Morrison et al. (2019) and Streamlined ID, which place technology and message selection towards the end of the

design process—in Chapter 10, Design Technologies, and Chapter 11, Design Instructional Messages. However, the practical reality is that even when designers have a clear instructional strategy, the available technologies—such as a designated learning management system (LMS)—often shape what is possible in the design. This reciprocal relationship means that decisions made early in technology selection will inevitably influence multimedia and message design, impacting how content is ultimately presented and experienced by learners. Understanding these dynamics is essential for ensuring that instructional design remains both intentional and ethically sound.

Technology Selection

The selection of technology and supporting multimedia are often areas where ID students are typically very excited to research and provide details on technology tools they find useful for instruction. This enthusiasm for technology is also reflected in the history of the field, where critical scholarship has long centered on the role of educational technology selection as a key decision point in the design process. This focus is not surprising, as one of the field's origins was the thoughtful incorporation of instructional artifacts and media to improve learning (Reiser, 2001). In today's environment, with a proliferation of technology options, interrogation—or critical questioning—has become an essential strategy in the technology and materials selection process.

ID students are often excited to try new tools or integrate materials that they have either used and liked or have wanted to put to good use. However, when it comes to technology, the alignment between the requirements and constraints of a design project is critical. The step of technology and content materials selection is an opportune moment to raise broader considerations such as accessibility, data rights and privacy, affordability, and environmental impacts—factors that must be weighed alongside technical features and affordances.

Ideally, we would first define our pedagogical vision and then select the technology to support it. In reality, however, the moment we begin to identify tools, the affordances of that technology start to impact changes to our pedagogical approach. This phenomenon is captured by Fawns et al. (2022) as "entangled pedagogy," where our technology choices act in tandem with other design components. In other words, it is not possible to define all instructional parameters and then select the technology separately. Instead, technology must be considered early in the analysis stage during the contextual analysis, addressed through the infrastructure questions we added earlier in this chapter, and revisited throughout the design cycle.

To address these considerations with ID students, I use an activity where learners are asked to evaluate the affordances of a chosen technology tool, assessing what it enables in terms of capabilities and identifying ethical considerations that arise when using it in instruction.

There are several common ethical considerations that arise around technology selection, such as:

- **Accessibility:** Does the tool support diverse learner needs (e.g., captions, screen reader compatibility)?

- **Data Rights and Privacy:** Can students consent to or opt out of data collection, and is the data used solely for instructional purposes?
- **Security:** Are sensitive or student-produced data and artifacts protected against breaches?
- **Affordability:** Is the tool financially accessible for the intended audience?
- **Access and Availability:** Is the technology available and reliable in the learning environment?
- **Dignity and Privacy:** Does the tool involve monitoring or surveillance that could compromise learner dignity (e.g., online proctoring systems)?
- **Environmental Impact:** Does the tool contribute to digital waste or require significant energy to operate, such as generative AIs?

Integrating these ethical considerations alongside technical affordances ensures that technology choices not only support instructional goals but also reflect broader commitments to fairness, sustainability, and respect for learners.

Whether technology selection is situated within an instructional design project or conducted as a stand-alone task by a technology coordinator or classroom teacher, the same ethical framework applies. In classes where students explore different technologies, we use an activity in which they create evaluation rubrics. These rubrics explicitly prompt students to articulate both technical and usability specifications—such as price, features, and compatibility—as well as instructional and ethical criteria. The following is an example of an activity for ID students to critically evaluate technology:

> *For technology selection, a common practice by designers, educators, and decision makers alike is to develop an evaluation rubric that helps them evaluate and compare different technologies. These regularly include technical specs or requirements and usability specs, like price and specific desired features or capabilities like interoperability. Additionally, instructional needs or specifications are often incorporated. Ethical considerations – like accessibility, data rights and privacy, dignity and consent, affordability, access, and environmental impacts - can similarly be articulated as parameters or specifications for evaluation and selection.*
>
> *Using the table below as a structure, develop a technology evaluation rubric for your project. You may also want to consider weighting elements in your rubric. Develop your own rubric first and post to the discussion. Once you post, you'll be able to see others. I'd like to you to revise yours and post a revised rubric by the end of the week based on ideas you really like from others in class.*

Technical requirements	
Usability requirements	

Instructional Requirements	
Ethical Considerations	
Legal Requirements	

Some helpful additional readings for a week, unit or class that involves technology selection are summarized in Table 6.

Table 6

Additional Readings and Resources for Ethics and Technology Selection

Framing	Additional Readings or Resources
The example activity above incorporates framing and creates an opportunity for students to apply their learning. This activity can also be incorporated into routine ID or ed tech decision making practices.	Civics of Technology details on conducting an EdTech audit: https://www.civicsoftechnology.org/edtechaudit Civics of Technology project and main website: https://www.civicsoftechnology.org/ Krutka, D., Heath, M., and Staudt-Willet, B. (2019). Foregrounding technoethics: Toward critical perspectives in technology and teacher education. *Journal of Technology and Teacher Education, 27*(4), 555-574. Moore S. & Tillberg-Webb, H. (2023). *Ethics and educational technology*, Ch. 9

You may want to consider incorporating other tools into your classes for technology selection activities as well, such as critical design, speculative design, or futurisms.

Multimedia and Materials Selection and Message Design

Like technology selection, multimedia and content materials selection or development is also an opportunity time to raise topics such as accessibility, representation (stereotyping, cultural, etc.) in the materials, affordability, copyright, and other possible questions that may be asked of the materials. In addition to a brief introduction of the design principles such as Mayer multimedia principles (Mayer, 2020; Mayer & Fiorella, 2014) and visual design principles like Contrast, Alignment, Repetition and Proximity, or CARP (Williams, 1994), I also introduce ethical considerations such as accessibility, ethical use and fairness, and cultural sensitivity and inclusivity.

To support students, I've developed checklists for them to use depending on whether they are developing a prototype (e.g., in PowerPoint), a web-based prototype, or some other sort of multimedia material. We have added these checklists as appendices to this article (see Appendices A, B and C). As students develop and work on their prototypes or materials, I have them use these checklists as a way to integrate at least some basic ethical considerations as new instructional designers to scaffold these in as default considerations.

Appendix 1 - Prototype Checklist | Appendix 2 - Web-based Design Checklist | Appendix 3 - Multimedia Selection Checklist

Evaluation

Evaluation is already a robust topic for beginning instructional design students. ID students often have heard assessment and evaluation used interchangeably in practice and are not aware that they are different concepts. In an introductory ID course, ID students are grappling with several new terms related to assessment and evaluation: formative and summative assessment, as well as formative, summative and confirmative evaluation. ID students need to know the variety of potential types of assessment and evaluation is important to have ID students thinking about how to broadly and holistically consider multiple data and perspectives when looking at the effectiveness of a training program.

When addressing ethics in evaluation for instructional design students, there are several key considerations, to emphasize these considerations in data collection for evaluation, including but not limited to:

- Obtaining informed consent,
- Conducting an inclusive process,
- Identifying potential for discriminatory treatments (House, 2017),
- Considering socio-political context,
- Remaining cognizant of potential power imbalances (IATD, 2021),
- Articulating a clear plan for data collection, management, and storage which takes into account privacy and data security,
- Engaging in transparent communication throughout all processes,
- Ensuring that any evidence of harm be addressed immediately, and
- Striving for objectivity in reporting and not letting powerful voices obscure evidence.

When asking ID students to consider evaluation in their course project, they are asked to consider formative, summative and confirmative evaluation, as well as Kirkpatrick's four levels of evaluation. While Kirkpatrick's 4th level already considers broader outcomes, Barnett and Camfield (2016) propose that evaluation ethics go beyond simply "doing no harm" to actively contributing to social progress ("doing good"). This aligns well with the 4th level of Kirkpatrick's evaluation, which strives to measure the broader impact of training programs and can be used to actively determine if a training program is "doing good."

Revising the introduction of Kirkpatrick's levels of evaluation to include ethical considerations helps seamlessly orient ID students to all the considerations. Table 7 shows a before and after that incorporates ethical considerations into each level of Kirkpatrick.

Table 7

Incorporating Ethics into Kirkpatrick's Levels of Evaluation

Kirkpatrick Level	Original Course Treatment	Revised to Incorporate Ethics
Level 1: Learner Reaction	Evaluations conducted at this level measure the reaction and satisfaction of learners with the learning experience. A positive reaction can enhance learning and may indicate that the instruction successfully addressed learner interests, attention and motivation.	Evaluations at this level gather feedback from participants about their experience in the program. It's necessary to obtain informed consent before collecting any data, ensuring participants fully understand what information is being gathered and how it will be used. Additionally, an inclusive process should be designed to give all participants, regardless of their background or status, a voice. Feedback collection methods should not favor certain groups over others. It's important to recognize and navigate the socio-political context in which the program operates, as participants may come from different cultural or institutional environments that influence how they respond. Throughout this process, we should clearly communicate with participants about how their data will be managed and ensure privacy and data security are prioritized to protect sensitive information. How will you ensure that data that you collect is used to improve the program and also that anyone sharing their honest opinion can be comfortable sharing that opinion without any repercussion, whether it be to their

Kirkpatrick Level	Original Course Treatment	Revised to Incorporate Ethics
		grade in a course, their job in a company or future opportunities for learning?
Level 2: Learning	This level of evaluation measures the extent to which participants acquire the intended knowledge, skills and attitudes as a result of the instruction. This is also known as assessment.	This level of Kirkpatrick measures what participants gained from the program. This would encompass all summative assessments in the training program. Ethical considerations here include creating inclusive and fair assessments that avoid cultural or social biases and do not disadvantage any particular group. Are all learning assessments designed with accessibility in mind, so that learners can be successful? Have we considered the language and examples in the assessments and ensured they are directly aligned to the outcomes and measuring learner's progress on examples and application connected to that content? When using assessment data from a learning experience to evaluate program success, how are we ensuring that learner data is protected and private, so as to not violate learners' expected confidentiality of their individual progress?
Level 3: Behavior	This level evaluates to what degree the learner applies what was learned in the final work context (e.g., in a job, in the next course, in life). Application of new learning is not only dependent on what has been learned, but also by the final performance/work context. Provide support and accountability in that context by implementing and tracking processes and systems (i.e., drivers) that reinforce, monitor, encourage, and reward performance of critical behaviors on the job. This	For Kirkpatrick's Level 3, we evaluate whether participants are applying what they've learned in practice in their job environment or a real-world scenario. This level is also known as "Performance" or "Transfer." Determining Level 3 results may involve observing participants in their work or personal environments. Ethical issues related to informed consent are critical here—participants must be fully aware of and agree to any form of observation or monitoring. This should be the case if we're collaborating with managers instead of individual employees as well. Additionally, we want to make sure that it is transparent what behaviors are being assessed and why. Lastly, we would want

Kirkpatrick Level	Original Course Treatment	Revised to Incorporate Ethics
	level is also known as “Performance” or “Transfer.”	to make sure that we’re accounting for different cultural and social norms as well as different ways that learners might naturally work. Finally, once this data is collected– how will it be used? If learners did not favorably apply new skills, how will the evaluator ensure trust with the community is sustained while improving the training program to strive for more effective results.
Level 4: Results	Measuring and reporting results enables you to justify the cost of the learning experience by demonstrating its value to the sponsoring organization. Your results should clearly illustrate the “impact” of the instruction on the organizational goals it was designed to achieve. Monitor leading indicators of success. Identify desired outcomes and take benchmark measurements at the beginning of the project, and then re-measure following the instruction to demonstrate results/impact.	Level 4 of Kirkpatrick is difficult to attain and also the driving reason for training programs. The broader impact of the training program is the focus of this level of evaluation. Measuring and reporting broad results enables you to justify the cost of the learning experience by demonstrating its value to the sponsoring organization. Your results should clearly illustrate the “impact” of the instruction on the organizational goals it was designed to achieve. Monitor leading indicators of success. Identify desired outcomes and take benchmark measurements at the beginning of the project, and then re-measure following the instruction to demonstrate results/impact. All the same considerations of ethical engagement with stakeholders and handling of data apply to Level 4.

Weaving Ethics into the IDT Curriculum

Thinking beyond the typical instructional design class, ethics across the curriculum is a well-documented approach to integration of ethics. We want to close with some ideas where ethics can be integrated into other common or specialty classes in an IDT program. For practitioners, although we are articulating this in terms of classes, many of these represent tasks, activities or projects in practice, so these suggestions should be highly transferrable into practice as well.

During a session on ethics at the Professors of Instructional Design and Technology (PIDT) in 2024, several session participants raised a number of additional ideas for ways in which they could integrate ethics into their courses and curricula or make more explicit for students how some of their classes, topics, and research agendas have ethics woven right into the fabric. Some of these topics may be something covered in an introductory instructional design course as an ancillary topic or may be introduced in other key classes in the instructional design curriculum. We've summarized connections and ideas in Table 8.

Table 8

Ethics Across the IDT Curriculum

Class / Topic	Connections and Ideas
Online learning design	As online learning design is a subset of ID, many of the same issues for ID map into the online learning space. Common ethics topics that arise with online learning and could be integrated into a class include academic integrity, equity, and accessible online environments. In a recent special issue of *Distance Education* (https://www.tandfonline.com/toc/cdie20/45/3?nav=tocList), authors wrote multiple pieces on designing for equity in online learning. Students could select a case to read from that special issue. Others have also written on applying care ethics to online learning as well as the specific principle of hospitality. Scholes has explored the tradeoffs and ethical impacts of a strategy to support online learners that reframes learners as interdependent instead of independent – this article could be integrated into the class as well.
Multimedia Development / Instructional Materials Design	In a class on multimedia learning / materials design and development, topics such as accessibility, copyright, and representation in media can readily be integrated into the class and even into rubrics for class assignments. Stephanie incorporates accessibility into project requirements and includes readings and resources on accessibility with some weekly activities to help students develop some skills in her class on multimedia design and development. She also includes a vignette from a simulation design team who centered racial justice and equity in their design and development process and prompts students to consider representation in their own designs and in existing materials (e.g., OERs) they may select to use.
Learning analytics	Learning analytics is one of the topics where we first saw more active discussion on ethical considerations in the field's literature. Chapter 4 in our book has an Ethics in Practice section dedicated to ethics and learning analytics with several recommended activities and readings. An excellent set of readings that we strongly recommend includes Pardo and Siemens (2014), Scholes (2016), Slade and Prinsloo (2013), Kay et

Class / Topic	Connections and Ideas
	al (2012), and Sclater (2014). In 2020, a special issue of Educational Technology Research & Development was also dedicated to ethics and learning analytics, so that issue is a rich resource as well.
AI / Emerging Technologies	The discourse on ethics and AI has been the most active we've seen in our review of ethics literature. Generative AI (GenAI) specifically prompts a lot of concerns over authenticity, bias and discrimination in the data set, and environmental impacts, among other concerns. Since there is a lot to sort through, we have some recommendations on pieces that both summarize issues and connect it to practice with approaches that aren't dismissive of either the technology or the ethical considerations. Consider incorporating articles such as Sankaranarayanan & Park (2024) in this open book and Moore et al. (2024). Additionally, a course on AI or emerging technologies generally (or new ones in the future) could also include readings and discussions on unintended consequences. Rogers' (1995) classic Diffusion of Innovations includes some great discussions on unintended consequences, cases where cultural impacts are highlighted, and a discussion on innovation bias. This can be a great opportunity to introduce new students to Rogers' work and invoke more discussion on possible implicit biases towards new innovations along with considerations of unintended consequences. Stephanie uses excerpts from Rogers instead of the entire text in her class on ethics and IDT with companion discussions on checking our own biases and cultural aspects of unintended consequences.
Design Based Research (DBR); Change; Systems	We included these courses because ethics in such courses may be less obvious, and thinking through these course topics may prompt ideas for other courses as well. In discussing a colleague's DBR class with her, we pointed out that DBR has an implicit ethos of designing *with* instead of designing *for* intended users. Often, however, we don't unpack the ethos at the center of some of the work we do, but it's there. A common central ethos to online learning and mobile learning, for example, is access to education. Consider unpacking the underlying ethos of a method or model or strategy in your class and discussing how strategies like stakeholder involvement are reflective of ethics in practice. In Chapter 3 of our book, we devote a large section to stakeholder involvement as a major strategy for ethics in practice, in a number of areas, not just DBR. Change and systems also involve a number of topics where ethical considerations arise, from stakeholder involvement to shared agency in design to innovation bias to systemic thinking as a tool for identifying possible consequences and impacts. In

Class / Topic	Connections and Ideas
	Chapter 3, we highlight how ethical considerations are implicit features of much of the change and systems literature.

Through the ideas presented on how ethics might be integrated into an ID class as well as other classes across the IDT curriculum, we hope this chapter prompts some ideas for instructors and helps you develop a sense of comfort with incorporating ethics into your classes and curricula. We would like to return to the notion of ethics as design as a way to help you frame issues or discussions that may feel uncomfortable when they arise: ethics are not about declaring or judging something to be right or wrong, ethical or unethical. Because of diverse perspectives that individuals bring – to our classes and to our field – substantive disagreements are likely. Just like there are not neat answers to design problems, there are not neat answers to ethical problems. But that doesn't stop us from devising possible solutions. As you work with students, feel free to acknowledge the trade-offs and imperfections and draw on your own expertise with design and design thinking to help re-frame ethics as a form of problem solving that doesn't aim for perfection or absolutes but for possibilities and options.

References

Antonenko, P. D., Dawson, K., Cheng, L., & Wang, J. (2020). Using technology to address individual differences in learning. In M. J. Bishop, E. Boling, J. Elen, & V. Svihla (Eds.), *Handbook of Research in Educational Communications and Technology* (pp. 99–114). Springer. https://doi.org/10.1007/978-3-030-36119-8_6

Brooks, C. & Grajek, S. (2020, March 12). Students' readiness to adopt fully remote learning. *Educause Review.* Retrieved from https://er.educause.edu/blogs/2020/3/students-readiness-to-adopt-fully-remote-learning

Custodio, J. (2020, April 7). Disabled students already faced learning barriers. Then coronavirus forced and abrupt shift to online classes. *The Chronicle of Higher Education.* Retrieved from https://www.chronicle.com/article/disabled-students-already-faced-learning-barriers-then-coronavirus-forced-an-abrupt-shift-to-online-classes/

Davies, I. K. (1978). Educational technology: archetypes, paradigms and models. In J. Hartley and I. K. Davies (Eds.), *Contributions to an educational technology, Volume 2.* Kogan Page.

Davis, M. (1999). Ethics and the university. Routledge.

Deci, E., La Guardia, J., Moller, A., Scheiner, M. & Ryan, R. (2006). On the benefits of giving as well as receiving autonomy support: Mutuality in close friendships. *Personality and Social Psychology Bulletin, 32*(3), 313-327. https://doi.org/10.1177/0146167205282148

Dick, W., Carey, L., & Carey, J. O. (2009). *The systematic design of instruction* (7th ed). Pearson Education, Inc.

Dunne, A., & Raby, F. (2013). *Speculative everything: Design, fiction, and social dreaming.* The MIT Press.

Dunne, A. & Raby, F. (2024). *Critical Design FAQ.* Dunne & Raby. https://dunneandraby.co.uk/content/bydandr/13/0

Ely, D., & Plomp, T. (1996). *Classic writings on instructional technology.* Libraries Unlimited.

Feenberg, A. (2008). Critical theory of technology: An overview. *Information technology in librarianship: New critical approaches*, 31-46.

Ferris, K., Svihla, V., Davis, S., and Kellam, N. (2024). Leveraging speculative design for transformative organizational change in higher education. *OTESSA 2024 Ethics in Design Showcase.* https://otessa.org/ethicsindesign/2024/06/09/leveraging-speculative-design/

Finn, J. D. (1953). Professionalizing the audio-visual field. *Audio Visual Communication Review, 1*(1), 6-17.

Finn, J. D. (1962). A walk on the altered side. *The Phi Delta Kappan, 44*(1), 29-34.

Gagné, M. (2003a). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion, 27*, 199-223. https://doi.org/10.1023/A:1025007614869

Gangé, M. (2003b). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*(4), 372-390. https://doi.org/10.1080/714044203

Gray, C. M., & Boling, E. (2016). Inscribing ethics and values in designs for learning: A problematic. *Educational Technology Research and Development, 64*(5), 969–1001. https://doi.org/10.1007/s11423-016-9478-x

Guersenzvaig, A. (2021). *The goods of design: Professional ethics for designers.* Rowman & Littlefield.

Heath, M., Krutka, D., Jarke, J., & Macgilchrist, F. (2023). Critique needs community: On a humanities approach to the civics of technology. *Postdigital Science Education, 6*(1), 369-82.

Hodges, C.B., Moore, S.L., Lockee, B.B., Bond, M.A., & Jewett, A. (2021). An instructional design process for emergency remote teaching. In D. Burgos, A. Tlili, & A. Tabacco (Eds.), *Radical solutions for education in a crisis context. Lecture Notes in Educational Technology* (pp.37-51). Springer Nature. doi: 10.1007/978-981-15-7869-4_3

Ifenthaler, D. and Tracey, M. (2016). Exploring the relationship of ethics and privacy in learning analytics and design: Implication for the field of educational technology. *Educational Technology Research & Development, 64*(5), 877-880.

Ingraham, K. & Boyd, B. (2020). Social justice in simulation: Design challenges and ethical concerns for diverse virtual training environments. AECT 2020 Convention, virtual.

Johnson, B. (1993). Polarity management. Executive Development, 6, 28-28.

Kaufman, R., Corrigan, R., & Johnson, D. (1969). Towards educational responsiveness to society's needs: A tentative utility model. *Socio-Economic Planning Sciences, 3*, 151-157.

Kimmons, R. (2020). Current trends (and missing links) in educational technology research and practice. *TechTrends, 64*(6), 803–809.

Krutka, D., Heath, M. & Mason, L. (2020). Technology won't save us – a call for technoskepticism in social studies. *Contemporary Issues in Technology and Teacher Education, 1*(20), 108-120.

Krutka, D., Heath, M. & Staudt-Willet, B. (2019). Foregrounding technoethics: Toward critical perspectives in technology and teacher education. *Journal of Technology and Teacher Education, 27*(4), 555-574.

Lachheb, A., Abramenka-Lachheb, V., Moore, S., & Gray, C. (2023). The role of design ethics in maintaining student privacy: A call to action to learning designers in higher education. *British Journal of Educational Technology, 54*(6), 1653-1670. https://bera-journals.onlinelibrary.wiley.com/doi/10.1111/bjet.13382

Larson, M. & Lockee, B. (2020). *Streamlined ID: A practical guide to instructional design, 2nd ed.* Routledge / Taylor & Francis.

Moore, S. (2009). Social Responsibility of a Profession: An Analysis of Faculty Perception of Social Responsibility Factors and Integration into Graduate Programs of Educational Technology. *Performance Improvement Quarterly, 22*(2), 79-96. https://doi.org/10.1002/piq.20055

Moore, S. (2021). The design models we have are not the design models we need. *The Journal of Applied Instructional Design, 10*(4). https://dx.doi.org/10.51869/104/smo

Moore, S., & Ellsworth, J. (2014). Ethics and standards in educational technology. In J.M. Spector Editor, M.D. Merrill Editor, J. Elen Editor, & M.J. Bishop Editor (Eds.), *Handbook*

of research on educational communications and technology, 4th ed. (pp. 113-127). Springer. https://doi.org/10.1007/978-1-4614-3185-5_10

Moore, S. & Griffin, G. (2022). Integrating ethics into the curriculum: A design-based approach for preparing professionals to address complex problem spaces. In J. Stefaniak and R. Reese (Eds.), *The instructional design trainer's guide: Authentic practices and considerations for mentoring ID and ed tech professionals* (pp. 121–134). Routledge.

Moore, S., Hedayati-Mehdiabadi, A., Kang, P., & Law, V. (2024). The change we work: Agency and ethics in emerging AI technologies. *TechTrends, 68*, 27-36. https://doi.org/10.1007/s11528-023-00895-1

Moore, S. & Tillberg-Webb, H. (2023). *Ethics in educational technology: Reflection, interrogation, and design as a framework for practice.* Routledge / Taylor & Francis.

Morrison, G., Ross, S., Kalman, H. & Kemp, J. (2019). *Designing effective instruction (8th ed.)*. John Wiley & Sons.

Osguthorpe, R. T., Osguthorpe, R. D., Jacob, W. J., & Davies, R. (2003). The Moral Dimensions of Instructional Design. *Educational Technology, 43*(2), 19–23.

Pardo, A. and Siemens, G. (2014). Ethical and privacy principles for learning analytics. British Journal of *Educational Technology, 45*(3), 438-450. https://doi.org/10.1111/bjet.12152

Reeves, T.C. & Reeves, P.M. (2015). Educational technology research in a VUCA world. *Educational Technology, 55*(2), 26-30. https://www.learntechlib.org/p/174982/.

Rieber, L., & Estes, M. (2017). Accessibility and instructional technology: Reframing the discussion. *Journal of Applied Instructional Design, 6*(1), 9-19. https://edtechbooks.org/-lof

Rieser, R., Carr-Chelman, A., and Dempsey, J. (2024). *Trends and issues in instructional design and technology,* 5th ed. Routledge.

Ritzhaupt A.D., Cheng L., Luo W., Hohlfeld T.N. (2020) The Digital Divide in Formal Educational Settings: The Past, Present, and Future Relevance. In: Bishop M.J., Boling E., Elen J., Svihla V. (eds) *Handbook of Research in Educational Communications and Technology* (5th ed.). Springer, Cham. https://doi.org/10.1007/978-3-030-36119-8_23

Rogers, E. (1995). *Diffusion of innovations (4th ed)*. Free Press.

Sankaranarayanan, R. & Park, J. (2024). AI-driven instructional design: Ethical challenges and practical solutions. In S. Moore and T. Dousay (Eds.), *Applied Ethics for Instructional Design and Technology.* Edtechbooks. https://edtechbooks.org/applied_ethics_idt/AI_instructional_design_ethics

Scholes, V. (2016). The ethics of using learning analytics to categorize students on risk. *Educational Technology Research & Development, 64*(5), 939-955.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* Basic Books.

Selwyn, N. (2015). Technology and education—why it's crucial to be critical. In *Critical Perspectives on Technology and Education* (pp. 245-255). Palgrave Macmillan US.

Shanks-Kaurin, P. (2018). Questioning military professionalism. In N. K. Finney & T. O. Mayfield (Eds.), *Redefining the modern military: The intersection of profession and ethics* (pp. 9–20). Naval Institute Press.

Slade, S. and Prinsloo, P. (2013). Learning analytics: ethical issues and dilemmas. *American Behavioral Scientist, 57*(10), 1510-1529. https://doi.org/10.1177%2F0002764213479366

Stickdorn, M., Hormess, M. E., Lawrence, A. & Schneider, J. (2018). *This is service design doing: Applying service design thinking in the real world* (1st ed.). O'Reilly Media.

Sutherland, B. (2024). Redesigning computing for openness – the ethics of consuming devices. *OTESSA 2024 Ethics in Design Showcase*. https://otessa.org/ethicsindesign/2024/06/09/ethics-of-consuming-devices/

Svihla, V. (2020). Problem framing. In J. K. McDonald & R. E. West (Eds.), *Design for learning: Principles, processes, and praxis.* Retrieved from EdTech Books. https://edtechbooks.org/id/problem_framing

Svihla, V., & Kachelmeier, L. (2022). Latent value in humiliation: A design thinking tool to enhance empathy in creative ideation. *International Journal of Design Creativity and Innovation, 10*(1), 51-68. https://doi.org/10.1080/21650349.2021.1976677

Tessmer, M., & Richey, R. C. (1997). The role of context in learning and instructional design. *Educational Technology Research and Development, 45*(2), 85-115.

Tracey, M. W. & Baaki, J. (2014). Design, designers, and reflection-in-action. In B. Hokanson & A. Gibbons (Eds.), *Design in educational technology: Design thinking, design process, and the design studio* (1st ed., pp. 1–13). Springer.

Vogels, E., Perrin, A., Rainie, L. & Anderson, M. (2020, April 30). 53% of Americans say the internet has been essential during the COVID-19 outbreak. Pew Research Center. Retrieved from https://www.pewresearch.org/internet/2020/04/30/53-of-americans-say-the-internet-has-been-essential-during-the-covid-19-outbreak/

Warschauer, M. (2002). Reconceptualizing the digital divide. *First Monday, 7*(7). Retrieved from https://firstmonday.org/ojs/index.php/fm/article/view/967/888

Warschauer, M. (2003). Demystifying the digital divide. *Scientific American, 289*(2), 42–47. https://doi.org/10.1038/scientificamerican0803-42

Whitbeck, C. (1996). Ethics as design: Doing justice to moral problems. *The Hastings Center Report, 26*(3), 9–16.

Willingham, D., & Daniel, D. (2012). Teaching to what students have in common. *Educational Leadership*, *69*(5), 16–21.

Wilson-Fetrow, M. & Svihla, V. (2024). Speculative design in a summer camp: Tensions around infantilization. *OTESSA 2024 Ethics in Design Showcase*. https://otessa.org/ethicsindesign/2024/06/09/speculative-design-in-a-summer-camp/

Yeaman, A., Koetting, R. & Nichols, R. (1994). Critical theory, cultural analysis, and the ethics of educational technology as social responsibility. *Educational Technology, 34*(2), 5–13.

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Appendix 1

Prototype Checklist

Relevance and Cognitive Load	Is text clearly written and organized? Is only essential information included? Is the text broken into short paragraphs and sentences for readability? Are key concepts introduced early to support foundational understanding? Are visuals directly connected to the instructional content?
Accessibility	Are text styles (e.g., headings, body text) formatted to be readable by screen readers? Are symbols, diagrams, and visuals accompanied by clear descriptions? Is emphasis achieved using bold instead of color (such as red)?
Visual Hierarchy	Are headings and sub-headings used to exchange readability? Is text left-aligned aligned for optimal readability? Are related items grouped logically for easy association? Are consistent styles (font size, color, spacing) used?

Ethical Use and Fairness	Are all external materials properly cited? Are the source of images noted? Do activities respect privacy and/or confidentiality in content sharing?
Cultural Sensitivity and Inclusivity	Is language culturally respectful? Are examples inclusive? Are diverse perspectives represented? Are any characters in the design representing diverse backgrounds?

Appendix 2

Web-based Design Checklist

Relevance and Cognitive Load	Are all interactive elements purposeful? Is the content organized into logical sections with intuitive navigation?
Accessibility	Does every image have an alt-text tag with a clear description? Are links descriptive (e.g., “Read more about accessibility” instead of “Click here”)? Are high-contrast colors used to improve readability for users with low vision?
Usability	Is the layout responsive (adapting to different screen dimensions)? Are interactive elements (e.g., buttons, menus) easy to identify and use? Is related content visually connected (e.g., images next to relevant text)?

Visual Hierarchy	Is contrast used to emphasize key areas? Is spacing used to create clear separations between unrelated sections? Are repeated elements (e.g., navigation bars, headings) consistently applied?
Ethical Use and Fairness	Are all images, videos, and documents used in compliance with copyright? Is it clear how learner data will be used and/or stored?
Cultural Sensitivity and Inclusivity	Are visuals and language reflective of a diverse audience? Are design choices (e.g., icons, symbols) culturally appropriate?

Appendix 3

Multimedia Selection Checklist

Relevance and Cognitive Load	Is the pace of audio and video content suitable for maintaining attention and comprehension? Do text, visuals, and voiceover support understanding? Are multimedia elements (e.g., animations, audio) used strategically to reinforce key concepts without overwhelming? Is navigation clear and easy to follow?
Accessibility	Are captions provided for all videos, and are transcripts available for audio content? Do interactive elements (e.g., quizzes, simulations) provide alternative text descriptions?
Flexibility and Learner Control	Can learners control the pace (e.g., pause, replay) to accommodate different processing speeds? Can learners navigate multimedia content freely, choosing to skip or revisit sections?
Multiple Modes of Engagement	Are complex ideas presented through a combination of text, visuals, and audio? Is the same content offered in multiple formats (e.g., visuals with narration and text) to suit different learner needs?

Visual Hierarchy	Are visual cues used to guide attention to key points? Is the relationship between different elements such as text and animation visually clear?
Ethical Use and Fairness	Is multimedia content properly attributed and aligned with ethical guidelines? If housed on a platform requiring learners to log-in, what are the data privacy and security standards?
Cultural Sensitivity and Inclusivity	Are audio narrations recorded in a tone and style that respects diverse cultural norms? If learners provide audio or video input, does the system recognize a variety of dialects, accents, and other vocal variety? Are examples cultural relevant and sensitive?

Ethical Issues in Learning, Instructional Design, & Technology

Ethics | Instructional Design | Learning

In the book's second section, we delve into specific ethical issues such as environmental impacts, accessibility, racial and cultural considerations in design, justice, and rights for data use and analytics, and navigating ethical considerations of learner autonomy in online learning. Warren and colleagues offer much-needed discussion on the environmental impacts of educational technology. Their paper prompts professionals to consider climate change and educational technologies' ecological impacts, which “hides behind product ordering interfaces with simple pricing.” We hope this piece spawns a greatly expanded conversation and body of scholarship with implications for practice and decision-making. Lomellini and colleagues tackle a topic that has long been discussed, but mainly approached through legalistic and compliance orientations. They discuss how this is a limited and limiting approach, inviting instructional designers to approach accessibility through more of a design mindset

which embraces the iterative nature of devising solutions. Edouard's chapter embodies the spirit of creativity and imagination that ethical considerations can evoke as he explores a makerspace designed to foster the creativity and world-building of racially minoritized learners, especially Black children. His chapter provides a specific example of how ethical considerations – namely of race and equity – directly informed the design, development, and implementation of a makerspace for university and school-aged residents in West Philadelphia in the United States. Greenhalgh challenges us to move beyond "superficial nod[s] to questions of justice, harm, and power" to explore deeper assumptions about data ethics. He uses four broad questions about purpose (of education and of educational technology), quality, and voice to illuminate ways in which designers can move beyond surface-level treatments of data rights and privacy. Greenhalgh's piece echoes Davies' concerns and answers Davies' call with an example of how we understand the relationship between technology and education and how we can better question how technology shapes education's purpose and outcomes. Scholes exemplifies an ethics-as-design approach as she identifies how strategies that better support adult online learners can also carry risks for learners. She models how designers can identify ethical issues that create tensions - or conflicts between different design parameters – and provides ideas for how designers may navigate the need to make trade-offs through various design possibilities. Although her piece may focus on a particular context and set of design considerations, Scholes' piece serves as an excellent example of

how designers can identify ethical issues in any context and then use design methods and ideas to generate possible solutions. The last chapter in our collection, by Sankaranarayanan and Park, addresses recent concerns and practical approaches to the role of generative artificial intelligence (AI) technologies in instructional design practices. Moving beyond simply naming and identifying concerns, this chapter offers a rich array of practical strategies that designers can employ during different design tasks related to AI, both as a tool supporting instructional design and as a set of decisions on whether and how to use AI in educational contexts.

Educational Technology and its Environmental Impacts

Ethical considerations in the adoption of technology at scale using life cycle cost analysis and total cost of ownership approaches

Warren, S. , McGuffin, K. , Moran, S. , & Beck, D.

Educational Technology Consequences
Environmental Ethics
Scaling Up Technology Use
Technology Adoption
Total Cost of Ownership

As climate change driven by human consumption in capitalist economies continues to increase, instructional designers must be aware of the consequences of their technology acquisition decisions for the environment. Much of our ecological impact hides behind product ordering interfaces with simple pricing; however, the costs are present from the moment we select tools. This chapter aims to depict educational technology decisions made by instructional designers and educators as ones infused with ethical questions and consequences in the globalized supply chain and throughout the life cycle of each device

employed. Taking an indigenous worldview towards sustainability, coupled with an engineering life-cycle cost analysis that incorporates environmental considerations, we illustrate the questions facing instructional designers who seek to consider their technology choice impacts more ethically regarding the environment and those involved in the process of computer manufacture. Finally, we offer recommendations for mitigating ecological harm after the decision to acquire new learning technologies.

Introduction

In 2015, an international team of 18 researchers claimed that "four of the nine Planetary Boundaries have already been crossed [. . .] the climate has already changed, the biosphere has lost its integrity, the land-system has been altered and the biogeochemical cycles have been corrupted" (Steffen et al., 2015, as cited in Saratli, 2017). Planetary boundaries are the ecological constraints on human development, such as freshwater use, chemical pollution, and climate change (Clift et al., 2017). Exceeding these boundaries is likely to lead to agricultural, environmental, and civilization collapse over time, meaning we should attend to how we can reduce our impacts on each, especially since energy use negatively impacts many (Sovacool et al., 2022), mining pollution (Flexer et al., 2018; Phillips, 2016), transportation (Su & Sun, 2019), and other aspects of information technologies acquisition and use (Levinson, 2009).

As humans, we often seek technological solutions to common social challenges, such as the need to foster critical thinking in members of a society or educate a future workforce. Further, we must be mindful of our impacts on the world around us as we cope with new global challenges in an ever-changing world under threats from climate change and political unrest resulting from an unsustainable economic model. Our energy-intensive, capital-intensive, global supply-chain-focused distributive business approach resulted in adopting technology at a scale the world has not previously experienced. With a focus on lowest cost and highest efficiency production models, there remains a failure to consider the environmental and ethical concerns that arise with the rapid adoption and intensive use of information technologies that require additional scrutiny ranging from surveillance capitalism to misapplication of digital assessment (Krutka et al., 2021). This chapter aims to explore an increasingly important aspect of technology adoption largely unexplored in ethics of educational technology discussion; that is, the environmental costs to the planet resulting from adopting learning technologies at scale.

For example, 1:1 laptop initiatives that provide a personal device to each child for learning value also carry environmental costs with their manufacture, transport, use, and later elimination (Warren et al., 2022). Total cost of ownership calculations do not commonly include these expenses made by organizations (Ellram, 1995). Further, increased energy use from device adoption and associated pollution (e.g., carbon dioxide, methane, etc.), related toxic e-waste (Kitila, 2015), and other related negative consequences from climate change (Crimmins et al., 2016) are an increasingly costly outcome of technology use. Today's economic model is "dependent on resource exploitation that is structured so that such exploitation seems the only means of survival [. . .] however, we must also recognize that the earth has an inherent value, beyond human needs" (Alfred, 2009, p. 85). Failure to recognize this inherent value noted by Alfred, leads to unsustainable mindsets wherein there are no resources available for future generations and an uninhabitable planet as the air, water, and soil become increasingly destroyed through mining, transportation, energy use, and other exploitation that benefit only current generations. This exploitation and harm often extend into the creation and disposal of the educational technologies we use. However, it is rarely discussed in many articles today that propose using more new tools. Such hardware devices are made of processed materials extracted from the earth and often powered by energy created by burning polluting fossil fuels. Our positive intention as educators for a tool's use does not reduce their inherent harms because technology manufacturers use the same methods rooted in a linear, globalized, largely opaque supply chain for both office and educational technologies.

It is equally important to consider other ethical needs, given that educators are responsible for making good choices about the tools they adopt to ensure strong learning outcomes and no harm to students. With today's climate, it becomes increasingly important to consider the environmental impacts of our technology choices as part of that ethical responsibility to provide students with a sustainable future. This chapter examines the environmental impacts on communities from the manufacture, transport, use, and disposal of educational technologies individually and in aggregate as deployed at scale in different learning contexts. From these findings, we propose there is an ethical need to use the market power of educational institutions at scale to pressure manufacturers to engineer devices to be upgradable and longer lasting, use less environmentally harmful production techniques, lobby for a right to repair existing devices, while also being more mindful about the consequences of our educational technology choices from the mining of raw materials needed to construct them through disposal phases of the supply chain. In addition, we provide guidance regarding how to mitigate the environmental harms of educational technology once chosen by designers or instructors.

Background

The field of educational technology is increasingly aware of ethical issues related to how our tools impact student and instructor privacy, create imbalanced power relationships created with big data and surveillance, and other issues that have not been discussed significantly in the past (Krutka et al., 2021). However, as the complexity of these tools grows, the need to be aware of their use consequences and develop an ethical attitude towards them is an increasing focus of discourse in instructional designs that require technologies to support teaching, learning, and training (Moore, 2013). However, much of the current focus is on

using technologies already produced and their psychological impacts on learners. However, few studies focus on the antecedents of use, especially regarding the environmental impact of these technologies, starting from the acquisition of raw materials to the disposal of devices at the end of life. At every stage of the supply chain and use, there are human and environmental impacts that we are often unaware of because they hide behind brands, delivery companies, and impressive packaging. However, the actual costs are not transparent and, therefore, not part of our technology expense calculation. Unfortunately, as the earth's climate continues to change, if we are to behave ethically as social scientists recommending the use of technology and as practitioners implementing them, then improved awareness is necessary of the impacts of our educational tools on the environment and the people who produce them.

Human Contributions to Climate Change

A major contributor to climate change is the creation and use of today's technologies, ranging from fossil fuel-propelled ships and cars to computers of all sizes (Hill, 2017; Phillips, 2016; Joshi, 1999). Because today's capitalist economies and organizations are focused primarily on consumption, the operations of companies that lead to the technology in front of us tend to be hidden along with their environmental impacts. Building a computer requires mining raw materials that require high amounts of polluting energy use (Valero & Valero, 2020; Farjana et al., 2019), leading to greenhouse gas emissions (Liu et al., 2016) and toxic metals released, such as mercury and cadmium that can damage local groundwater (Birch, 2016; Sankhla et al., 2016), and soils (Jeong et al., 2021; Wang, 2015; Glodek et al., 2010). Every stage of the computer manufacturing supply chain that provides schools and students with devices has environmental consequences, contributing to climate change partly because of the economic philosophy that drives today's consumption-based culture.

Ethics and the Environment

In this section, we discuss the ethics of the environment from the perspective of economic philosophy and how human choices impact the world. In addition, we present examples of consequences of policy decisions (e.g., globalized technology production and reclamation) on human health in both local and distant countries. We frame the ethical considerations of technology, educational or otherwise, from the context of two different views of environmental ethics used to guide decision-making: exploitation and stewardship.

Different concepts of justice: Exploitation or responsibility to the land and its people

Alfred (2009) explained that the most common form of distributive social justice supported by sovereign states and their economies is rooted in capitalist worldviews. This conception focuses on growing businesses and industries to provide people with jobs as financial support. Capitalist philosophical and economic approaches tend to focus on natural resource extraction (e.g., fish, rocks, trees) to produce commodities with a value calculated only in dollars, with little consideration of the consequences of resource exploitation for the earth or the people in communities where it takes place (Birch, 2016). The earth's value to those ascribed to this capital extraction-focused philosophy is based primarily on aspects of the planet to exploit and distribute resources to humans. While generally useful for this

purpose, capitalist societies commonly measure these resources as monetary gains provided through use or non-use to those who control natural resources in terms of total economic value with stated preference methods (Harris & Roach, 2018). In this context, business organizations only value and are designed to generate knowledge that supports environmentally extractive work practices; as such, managers tend not to choose environmental policies, technologies, and processes with long-term sustainability, focusing instead on building supply chains for short-term profits (Long, 2021) and risk avoidance (Er Kara et al., 2021). The language of business philosophy in this perspective commonly employs the words explore and exploit, dating back to the 1960s (Levitt, 1965), and natural resources mining continues to do so (Long, 2021; Dino et al., 2020; Tutak, 2019). With this colonialist exploitation mindset, environmental sustainability is, at best, a secondary consideration. Today's social and business viewpoint is rooted first in achieving a profit or seeking solutions to environmental problems framed in government funding that mitigates possible financial losses for companies responsible for environmental harm, rewarding them for participating in cap and trade or green bond schemes (Long, 2021). However, these approaches provide little evidence that they reduce environmental damage, redistributing the harms from one region to another (Chan & Morrow, 2019); this approach often helps companies further exploit the climate crisis (Long, 2021).

The capitalist economic approach to justice contrasts with that of indigenous philosophies rooted in the view that "the earth was created by a power external to human beings, who have a responsibility to act as stewards, since humans had no hand in making the earth, they have no right to possess or dispose of it as they see fit – possession of land by humankind is unnatural and unjust" (Alfred, 2009, p. 84). In the capitalist perspective, Alfred noted at the outset of his earth-focused manifesto that the earth's exploitation is viewed as ethical by society because it supports the distribution of its resources for the benefit of humans, though unevenly. By contrast, the traditionalist indigenous view "recognize[s] a responsibility to participate in the economy with the intent of ensuring the long-term health and stability of people and the land; in this context, development for development's sake, consumerism, and unrestrained growth are not justifiable" (Alfred, 2009, p. 85). We assert that the sustainable, indigenous view is more in keeping with the efforts of today's instructional designers who believe in the inherent value of their learners and instructors.

This chapter is further grounded in an idea of shared justice offered by the 20th-century Indian subcontinental philosopher Vinoda Bhave, a student of Mahatma Gandhi. The bhoodan, or "land gift," movement espoused the idea that the land belongs to all people and that no individual should own it (James, 2013). As such, the earth and its limited resources should benefit everyone, not a chosen few with power and wealth who may damage it for their own profit while harming others through their actions. For the field of instructional design, what some call instructional engineering (Simmons, 2015), it would be wise to consider how we use the earth by transforming its raw materials into educational tools just as environmental engineers and scientists do by understanding the complexity of decision, action, and consequence for impacted environmental ecosystems (Kahl, 2016). The issue of whether the tools can cause harm to other humans or the environment, as well as whether or how we should use learning tools made of natural materials, raises this to the level of an ethical question no different than whether we should create a learning game relative to its impacts of students (Warren & Lin, 2012). However, the environmental impacts of educational technologies are not a common part of our field's considerations as they are not commonly thought of in the same vein as physical, psychological, or emotional harm.

Because of this separation, instructional designers and educators commonly have little knowledge of the impact of the manufacturing supply chain on our shared land or its people.

Ethics of Educational Technology and the Environment

In recognizing that the computer manufacturing supply chain makes a computer purchase a decision that is not ethically neutral, it is important to have models that consider additional costs and risks beyond the immediate purchase of the device. As we seek tools to foster learning improvement, the ethical question of "should we" becomes central to decision-making when starting to consider the environment and our responsibility for maintaining and protecting human health (Song & Li, 2014) as stewards of the earth's natural resources (Alfred, 2009). There are always trade-offs understood between the environmental impacts compared with potential learning gains relative to the immediate financial costs of these technologies. As such, we propose building a differentiated total cost of ownership (TCO) model (Zachariassen & Arlbjørn, 2011) resulting from a life-cycle cost analysis (LCCA) approach offered by Farr et al. (2016). This combined model goes beyond simple educational outputs to help decision-makers better consider the environmental impacts of the whole computer manufacturing supply chain rather than using an end-point financial calculation that oversimplifies the externalities of climate and ecosystem impacts and unaccounted for global cost drivers that should ethically complicate their purchase choices (Ellram, 1995).

Methodology

This section will explain the methodology used to estimate the e-waste, energy, and C02 production from technology adoptions at scale in U.S. public schools and higher education institutions. These research methods come from supply chain and operations management analytic approaches (Meindl & Chopra, 2010) to build aggregate, long-term models of current and long-term outcomes from resource uses. From these, we will also incorporate other financial costs to build out a total cost of ownership planning model from Farr et al.'s (2016) life cycle cost analysis (LCCA) that is modified to incorporate environmental impacts as part of the ethical responsibility of educational managers to consider.

Modified Life Cycle Cost Analysis: Incorporating Environmental Costs

Farr et al. (2016) provided a useful research process for creating a cost model with technology. This process is our starting point for a modified life cycle cost analysis incorporating environmental costs not commonly captured in business models. The following are the stages with descriptions that include our changes to accommodate environmental considerations:

1. Life cycle cost analysis requirements: This phase includes understanding stakeholders, which in our model includes a) instructors, b) students, and c) the environment. It also includes examining the technologies and the processes associated with their creation, from raw materials extraction through disposal.
2. Formalize the study: Collect and normalize data, including cost estimates. Create likely scenarios for modeling that reflect the reality of environmental impacts from technology manufacturing, acquisition, use, and disposal. Develop output metrics reflective of all forecast costs.
3. Conduct study: Formally estimate acquisition costs (i.e., basic financial aspects) and environmental costs (i.e., raw materials mining impacts, transportation-related pollution, manufacturing-related environmental costs, etc.) Create related financial and environmental cost risk profiles—detailed bottom-up cost estimate.
4. Document study: Develop risk analysis profiles for different settings/systems of interest. Locate needed data sources, conduct analysis, and report results for financial and environmental costs.
5. Stakeholder feedback: Explore whether the degree of financial and environmental risk will change the technology choices of your clients/instructors/institutions.
6. Life-cycle cost estimate: Calculate total cost of ownership, including environmental costs, risk profiles, and recommendations to mitigate the risk of harm.

The following section presents our approach to using life-cycle cost analysis that incorporates considerations of the environment and includes the creation of equations that can be employed to better understand the ecological impacts of an educational technology's choice from beginning to end of the supply chain, considering how a computer's materials move from idea to mining, manufacturing, use, and disposal.

Findings

Our results illustrate the environmental impacts of educational computing and give readers a model for studying the impacts of a potential adoption on their local setting. The findings are structured in alignment with Farr et al.'s (2016) LCCA stages to offer a coherent linear process. Environmental impacts resulting from each stage are estimated based on current costs reported in conservation-focused engineering research reports from researchers with expertise in calculating waste and pollution effects from manufacturing and use.

Stage 1: Life cycle cost analysis requirements for the environmental impacts of computer production and use

The first stage of the process establishes the basic requirements for performing the life cycle cost analysis regarding the environmental costs of producing a common educational technology requirement for institutions: the laptop computer. Understanding these costs begins with a review of the computer production process and supply chain. The device manufacturing process starts with the mining and refining raw materials needed to make computer parts. Stations refine materials into usable forms, and large trucks transport loads

from one facility to the next, generating air pollution and distributing waste in local soils and water (Marjovvi et al., 2022; Brodny, 2020; Zhang et al., 2015; Glodek et al., 2010) Further, analysis requires including the significant energy (Lenhardt, 2017; Williams, 2014), water (Agana et al., 2013), and human resources (Mmereki et al., 2016; Han & Liao, 2010) required to manufacture these devices. Once constructed, a modern, low-cost laptop (e.g., Chromebook) tends to rely on internet connections, adding energy and environmental pollution risks resulting from the use of large, energy use intensive, heat generating datacenters (Sovacool et al., 2022; Lenhardt et al., 2017). However, server farms' exponentially growing energy needs (Lenhardt et al., 2017) require electricity, often from polluting sources like coal or gas. The environmental impacts of technology choices commonly hide from the users behind dashboards and computer screens that display our educational applications.

Stage 2: Formalize the study

The study in our model is motivated by needing to understand the impacts of educational technologies from the perspective of the environmental costs beyond the simple financial calculations to buy needed devices (e.g., a new laptop costs USD $300). A driver for this study is the continued global growth of capitalist economies that rely on extractive industries to manufacture and transport new devices. However, there is likely little awareness on the part of instructional designers and other educators regarding negative short or long-term environmental impacts resulting from the computer manufacturing supply chain's energy and pollution on environmental and human health. For example, growing cases of asthma and other lung diseases due to air pollution implicate the materials and energy production needed to power computers (Sivaramanan, 2013), plastics are increasingly detected in the food supply (Lusher et al., 2017), along with human endocrine disrupting phthalate esthers used as a flame retardant in devices being present in the soil, vegetables (Wang et al., 2015), and marine ecosystems (Baloyi et al., 2021).

Stage 3: Conduct the study

The study is intentionally broad in its focus on computers to give readers a sense of the total costs of ownership beyond the simple financial calculation regarding whether needed devices are affordable. For most technology solutions, the determination results from knowing whether one has a large enough budget to afford the number of desired devices. For our example, in his or her planning, an instructional designer seeks to purchase a rolling laptop cart and 32 Chromebooks, which are necessary for a class to play a series of educational science games. The Tripp Lite CSC32AC Multi-Device Charging Cart priced from Newegg.com currently costs USD $1,268, including shipping. From the same vendor, an 11.6-inch display Chromebook (2 GHz, 32 GB SSD) from HP or Lenovo costs USD $250. For 32 units, the total financial cost for the devices is $8000, and they commonly have a lifespan ranging from 2–3 years, depending on use intensity. The total financial cost of purchase, including the cart, is USD $9,268. This cost does not include the energy use of the devices during an estimated 3-year period or associated pollution, nor the financial or environmental costs of disposal at end-of-life. It is important to be good stewards of the environment and have a better sense of the real life-cycle costs of our educational devices when making decisions.

Computer production: Ethics of resource use and human costs in manufacturing

To better understand the life-cycle cost of a computer, it is important to start with the educational requirements and how those become technological ones that potentially require the manufacture of new devices. As with other complex physical products, computer production relies on a similarly multifaceted supply chain process starting with raw materials mining. Once materials are acquired, they must be processed into usable forms, eventually leading to the creation and transport of the finished product (Caddy & Helou, 2007) to an educational institution for instructors and students. These devices are then disposed of when they reach the end of their natural, usable life cycle (Jayaraman et al., 2019). Each aspect of the supply chain has different impacts on the environment and the humans involved in gathering, processing, assembling, transporting, or disposing of the products (Ekener-Petersen & Finnveden, 2013). The first aspect of the supply chain needed to produce our educational technologies, which is the mining of the raw materials, tends to harm the communities where the mines exist and the miners themselves (Kasulaitis et al., 2015).

Computer manufacture: High resource and human costs

There is often the assumption in the field of educational technology that the tools are neutral because our educational design intention is to support positive learning outcomes. However, it is important to recognize that our intentions are not divorced from the physical realities of computer manufacturing and transportation to our classrooms. The natural resource use (e.g., water, chemicals, fossil fuels) for even a single computer results in a loss for the communities in which they extracted for production or once the device reaches the end of its life cycle (Wang et al., 2012), is associated with industrial pollution (Jeong et al., 2021; Levinson, 2009), and has lasting effects on the environment far past the end of a device's usable life (Babu et al., 2007). To be good stewards of the earth's resources, we must behave ethically with our technological choices. Understanding and documenting the resources used and their environmental costs is important.

Stage 4: Document study

At this stage of the LCCA process, we use available research study data from engineering and conservation journals to build estimates for the environmental costs associated with device manufacture to understand the ethical aspects of our choice betters when using technology to support educational outcomes. Doing so gives us an idea of the impacts of technology use at scale in educational institutions. It also helps better frame the ethical questions regarding the impact on the earth and the humans directly or indirectly impacted by our choices.

Device Production Calculated Simply, but High Environmental Costs

Due to restrictions on the length of this piece, we will continue to focus on the environmental impacts of computers since they are the most common educational hardware technology

employed in schools, universities, and corporate settings. Implementing tools at scale does not commonly consider the environmental materials involved in their production. As a starting point for what is needed from the environment to make a single computer, the following table provides an estimate of the raw materials required to make a single computer (Bridgen & Webster, 2007). While this is an older number, it is one of few available and remains commonly used in information technology engineering to estimate computer production materials costs, although due to some efficiencies gained over time in manufacturing, the water use may be as little as 1.8 tons today (Agana et al., 2013).

Table 1

Materials used to produce one personal computer (Generic)

Material Used	Unit	Amount used
Water	Tons	1.5
Chemicals/ Raw materials	Pounds	48
Fossil fuels (for energy production and transportation)	Pounds	530

This table only estimates the natural commodities needed to manufacture a machine and does not consider additional costs for mining equipment, energy use (e.g., diesel fuel), or pollution. The water involved in manufacture must be fresh groundwater to avoid contamination during the industrial processing of materials, reducing available clean drinking water in the communities used for computer manufacture (Bretzler et al., 2017; Sankhla et al., 2016). To produce enough machines for a 32-student classroom, we aggregated the environmental resource costs indicated in Table 2.

Table 2

Materials used to produce enough computers for one classroom (Generic)

Material used	Amount per unit	Calculated resources needed per classroom (32 units)
Water	1.5 tons	48 tons
Chemicals	48 pounds	1,536 pounds
Fossil fuels	530 pounds	16,960 pounds (@ 8.5 tons)

This natural resource use is high, and the freshwater and chemicals are often not recoverable in the manufacturing process (Agana et al., 2013; Baloyi et al., 2021; Ekener-Petersen & Finnveden, 2013). For example, computer manufacturing may harm the environment and people in it when flame retardants make their way into aquatic ecosystems

due to synthetic organic chemicals like phthalate esters found in computer plastics (Baloyi et al., 2021), releasing propylene into the atmosphere (Morgott, 2018), and dispersing sediments when transporting by truck (Jeong et al., 2021). To mitigate this problem, companies increasingly seek to capture chemical residues in wastewater and other sources, though this process is difficult and expensive (Agana et al., 2013; Dino et al., 2020). To better understand the impacts of using these materials on the environment and the people mining them, it is important to break them down into finer parts and understand their impact on the environment and the humans in it.

Raw Materials: Measuring Mining Impacts, Transportation, and Refinement

When engaging with a laptop computer, instructional designers, instructors, and students likely think of it as a whole machine rather than the sum of its parts. However, each component of that machine started its life as separate raw materials, often mined in countries with minimal worker safety protections (Phillips, 2016). Companies transport bits of the earth like crude oil for plastics, sand used to make glass, and precious metals for circuit boards to manufacturing plants for transformation into processed, usable forms. However, moving these components also deposits toxic elements into soils and the air through vehicle exhaust (Marjovvi et al., 2022). Once moved to the new location, the raw materials are made into plastic, lead, glass, and other processed materials. Then, these potentially toxic elements (PTEs) are released on their way to a location for assembly by a manufacturer of computer components. When such pollutants enter the air, soil, and water, they are inhaled, ingested, or enter the body through the skin, negatively impacting human health (Jeong et al., 2021). Table 3 presents the kinds of materials present in computers (Bridgen & Webster, 2007).

Table 3

Estimated amount and kind of materials present in a 3.7 pound Samsung Chromebook 4 (Samsung Group, 2022) 7 lb. device

Material	Precious metals	Plastic	Iron	Glass	Lead	Aluminum	Copper	Other (Chromium Mercury, etc.)	Totals
%	.02	23.0	20.47	24.8	6.3	14.17	6.93	4.3	100%
Translated weight (lbs.)	.00074	.851	.757	.918	.233	.525	.256	.156	3.70 lbs.

Although highly toxic materials such as cobalt or chromium are present in a computer only in small amounts, they remain harmful in low concentrations (Sankhla et al., 2016). However, other materials, such as plastics, are present in high amounts. They become more harmful when treated with flame-retardant phthalates that function as human endocrine system disruptors released in higher amounts when heated during use, harming human reproductive

systems, especially in children (Kasulaitis et al., 2015; Babu et al., 2007). Each material has specific uses in computers that allow them to function (Babu et al., 2007); however, each material also has health impacts shown in Table 4 that remain little discussed in the field of learning technologies.

Table 4

Computer materials, uses, and related potential adverse health impacts (Babu et al., 2007)

Hazardous material	Computer use	Health impacts
Antimony	Semiconductors; flame retardant	Long-term impacts include lung and heart disease
Arsenic	Circuit boards, LCDs, chips	Carcinogen-causing skin, liver, and other cancers
Bromine	Flame retardant	Thyroid problems, neurobehavioral disorders, liver tumors, and immune system disruption
Cadmium	Chip resistors, semiconductors, infrared, cables, wires, circuit boards	Kidney disease, liver, heart disease, bone loss
Chlorine	Used to make PVC and PCB plastics	Inhalation can lead to vomiting, coma, and possible death
Chromium (hexavalent)	Corrosion inhibitor on circuit boards	Nasal and sinus cancers, kidney and liver damage
Cobalt	Rechargeable batteries, disc drives	Causes asthma-like diseases, shortness of breath
Lead (Pb)	Soldering to join chips and components	Anemia, weakness, damages kidneys, brain, and nervous system, and is fatal at high levels
Mercury	Batteries, circuit boards	Toxic to the central, digestive, and peripheral nervous systems, lungs/kidneys, possibly fatal
Phthalates	Power cable coating	Toxic to human reproduction; changes in sex hormone levels, altered genital development
Polyvinyl chloride plastic	Computer casing	Congenital disabilities and damage to the brain, heart, liver, kidney, and

Hazardous material	Computer use	Health impacts
		skeletal system

Each toxic material can cause negative health consequences for those mining the materials, those transforming the materials in factories, during use, and again once the device reaches its end of life during the recycling and disposal process (Sankhla et al., 2016; Nuss & Eckelman, 2014).

Human Resource Costs in the Device Supply Chain

Beyond the direct impacts of mining and secondary effects on the environment, the manufacturing supply chain impacts humans living in resource-rich areas (Leuenberger et al., 2021; Amaral-Zettler, 2019). When natural resources are discovered, especially in indigenous and low-political power communities with few legal protections, companies historically work with local and national governments for access to raw materials (Alfred, 2009) following a neocolonial model (McKenna, 2011), engaging in forced relocation so they can access fossil fuels and other needed manufacturing resources (Birch, 2016). This approach meets the needs of the capitalist economic system and its ethics; however, it creates health, environmental, and economic harm to communities when extreme weather events later destroy homes, natural resources, and agricultural areas with increasing floods (Er Kara et al., 2021; Crimmins et al., 2016), soil and water pollution (Amaral-Zettler, 2019), and fires (Marjovvi et al., 2022). Further, the economic and political precarity of many people living in areas with natural resources means they are at elevated risk of receiving little financial benefit from exploiting the material in their region or may be exploited through low wages or slavery (Esouimeme, 2020; New, 2015). In addition, many mining operations in countries with high levels of political corruption and low regulation lead to unsafe working conditions and non-sustainable mining and processing practices that have caused considerable harm to human health, ranging from high exposure to carcinogens to increases in greenhouse gas emissions (Liu et al., 2016), in addition to other significant air, water, and land pollutants. With the growing need to mine lithium for computers and other electronic devices we use in educational technology, it is important to recognize that mining practices are chemically intensive and associated with high amounts of waste that are difficult to dispose of safely (Flexer et al., 2018) and the batteries are commonly non-recyclable. Considering the need for batteries in all laptops, instructional designers should plan to incorporate this disposal as an environmental ownership cost. Further, the energy needed for these batteries is associated with pollution because most of today's energy production systems still rely on fossil fuels such as coal and natural gas (Bakhshi & Sandborn, 2018).

Transportation on a Global Scale: Energy and Pollution Outputs

Every stage in the supply chain process involves using energy to power the extraction of natural resources, their transformation into usable forms, their manufacture into devices, distribution globally to the locations of use, and transport once a tool reaches its end-of-life. Each stage in computer manufacturing has different energy intensity levels that require

accounting for environmental use costs (Williams, 2004). Such consideration is needed because the financial models that produce the price educators see tend not to account for social and environmental costs. Under the pollution haven hypothesis (PHH), this situation exists because of lax environmental legal frameworks in countries where such work occurs and the reality that low-priced products rely on highly polluting, low-cost energy sources for manufacturing and transporting goods (Rezza, 2013). A computer's life-cycle energy use tends to be much higher during production (81%) than during active use (19%) locally (Williams, 2004), hiding this negative environmental impact from most technology adopters. Significant carbon emissions occur in the transportation of products, resulting in negative environmental impacts tied to climate change (Er Kara, 2021; Bazan et al., 2015). However, while a smaller component of energy use and pollution, it is important to consider the energy intensity of these devices throughout their lifecycle.

Energy and Pollution Impacts from Computer Use

The environmental impacts of using computers relative to energy use and associated pollution are presented in this section to illustrate the impact of choice to increase technology adoption. CO_2 emissions per KwH, an average of 1.4 tons of CO_2 per kWh for non-renewable sources, inform pollution estimates (Belkhir & Elmeligi, 2018). The following equation determines power consumption (kWh) per number of computers (n=32) included in the planning for the educational technology implementation example of a laptop cart and commonly available Chromebooks.

Where:

n_1 *= Number of computers per school campus per period*

E_c *= Energy use per computer unit*

Table 5 provides energy use and CO_2 estimates for a modeled single classroom 1:1 laptop implementation based on current power use and pollution statistics from the U.S. Energy Information Administration's (2021) estimates to create both one- and three-year profiles, with the latter being the expected life of a well-maintained laptop.

Table 5

CO_2 increase estimates for all campuses in a sample Chromebook cart implementation

Computer type	Power use by 32 computers per year (kWh)	CO_2 lb./ kWh)	Annual estimated CO_2 pounds per machine	CO_2 tons per model implementation (32 devices)
One year	30	.85 CO_2 pounds	42 pounds	1,344 tons
Three years	90	.85 CO_2 pounds	156 pounds	4,032 tons

Environmental Impacts of Computer Disposal

At the recycling and computer disposal stage, there are additional ethical concerns. Here, we discuss the policy challenges related to computer disposal at end of life, how e-waste impacts water, air, and earth (Brigden & Webster, 2007), and past or current impacts of recycling in countries like China that have been responsible for taking waste for processing from the U.S., Europe, and elsewhere for the last 15 years or more. While the U.S. recently proposed a recycling plan (U.S. Environmental Protection Agency (2021), it is likely with current weak state and federal laws that devices will not be recycled safely, and electronic waste will end up in landfills locally and in those of other countries with limited environmental protections (Marjovvi et al., 2022; Jeong et al., 2021; Levinson, 2009). Educational institutions should seek sustainable solutions to mitigate the negative impacts of e-waste by managing and minimizing their intake of new equipment, maximizing the life-cycle of devices by purchasing more sustainable products, and measuring their environmental impacts annually and over the lifetime of a technologies' use relative to learning gains to determine if their technology purchase and use plan leads to more effective learning outcomes achieved with greater environmental efficiency (Singhal et al., 2019; Park et al., 2018). However, stakeholder feedback is important before moving on in the decision-making process.

Stage 5. Stakeholder Feedback

At this phase of the life-cycle analysis, it is important to ask stakeholders whether they are comfortable with the situation and its environmental impacts if the learning plan and related technology adoption go forward. Questions should include whether impacted users believe the expected learning outcomes outweigh the likely environmental impacts of purchasing the tools, whether there is an adequate sustainability plan for maximizing the learning value and life-cycle of needed devices, and whether they see ways to minimize the need for new technologies. After using stakeholder feedback to capture feedback and make changes to the plan, build a total cost of ownership model with environmental considerations.

Stage 6. Life-Cycle Cost Estimate: Build a Model of Total Cost of Ownership with Environmental Considerations

Using the resulting data and the Total Cost for Society framework (DeClerck et al., 2018), the following is a total cost of ownership model that adds environmental costs for manufacturing and school energy use and projected pollution from different levels of technology adoption, as well as safe disposal costs (Groot et al., 2014). The most complex stage, total cost of ownership, starts with accounting for simple financial costs for purchase. Most immediate to the educational user, we include the number of devices and their energy and pollution costs directly impacting the institution. The model then asks for a calculation of immediate environmental extraction impact assessment (i.e., mining energy use and associated pollution, unrecoverable mining waste, transportation, etc.) followed by the analysis of long-term extraction community costs (i.e., community health impacts from pollution, environmental damage, clean-up costs, climate impacts from flooding, fire, etc.) Next, planners should consider environmental impacts resulting from energy use and

pollution during manufacturing and production phases, including transportation (i.e., energy use, soil, air, and water pollution). Next, one should consider point-to-point product transportation environment impacts for each other supply chain stage where materials or finished products are moved (i.e., manufacturer to distribution hubs to users' institution). Finally, the total cost of ownership incorporates the environmental and financial costs for safe recycling or disposal. The following mathematical calculation includes many environmental costs, though it is not exhaustive.

Where:

n_1 = *Number of computers*

E_c = *Energy use per computer unit*

P_c = *Annual C02 generate per computer unit (est. .87 tons)*

C_{ee} = *Immediate environmental extraction costs*

C_{el} = *Long-term community environmental extraction costs*

C_{em} = *Immediate environmental extraction costs*

C_{elm} = *Long-term community environmental extraction costs*

C_t = *Immediate environmental extraction costs*

C_{et} = *Long-term community environmental extraction costs*

C_{df} = *Financial disposal costs*

C_{de} = *Environmental impact disposal costs*

Once the total costs are determined, the instructional planner should compare these costs with expected learning gains. This approach allows a determination of the trade-offs between environmental impacts, financial costs, and possible learning gains. If a designer or educational manager determines that the benefits outweigh the costs, moving forward with technology adoption is deemed justifiable.

We recognize this is a complex calculation that is likely daunting to employ for an instructional designer or educational manager. While it may be too challenging to use, our purpose in providing it is to illustrate the high complexity of the supply chain and the commonly hidden environmental impacts that result from it. A simpler calculation for everyday use to get a sense of one's likely impact from educational computer acquisition is as follows:

Where:

n_1 = *Number of computers*

E_c = *Energy use per computer unit*

P_c = Annual C02 generated per computer unit (est. .87 tons)

C_{se} = Total supply chain environmental impacts

C_d = Environmentally safe disposal costs

Again, compare this estimated total cost of ownership with the estimated educational benefits of the tool over its entire lifetime. While it will not be exact, the goal is to help educational designers and managers make better decisions as to whether to purchase computers and in what quantity to balance the costs with possible benefits.

Discussion

The capitalist philosophy responsible for creating today's linear, consumption-driven economy is a primary driver of environmental harm today (Alfred, 2009). As such, we offer a technology planning strategy for instructional designers and educators based instead on indigenous views of social justice in which it is ethically necessary to "recognize that the earth has an inherent value, beyond human needs" (Alfred, 2009, p. 85). Therefore, our recommendations recognize that our devices start as raw materials mined from the planet. Each phase of the device life cycle, including manufacture, transport, use, and disposal, has additional environmental costs that we, as designers and educators, have an ethical responsibility to minimize.

Incorporating the Environment in Technology Adoption Planning Using Stewardship Philosophy

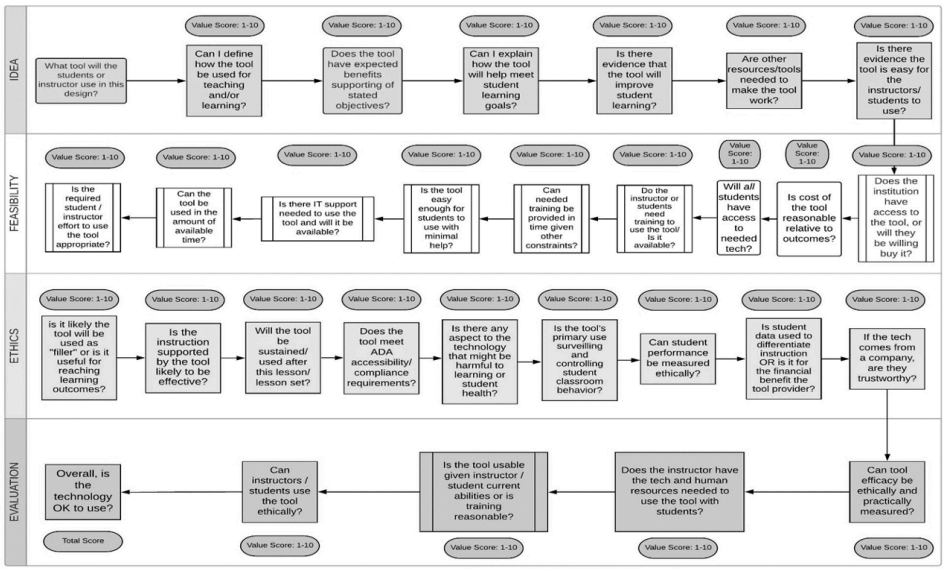
In this section, we provide a recommended planning model that incorporates total cost of ownership to help make the estimated environmental and financial costs transparent to managers before adopting technologies at scale. Knowing these costs can help designers, instructors, and managers make more informed decisions regarding their environmental impacts relative to evidence-based projected learning outcomes. As with other instructional design process models, a strong analysis is important for deciding to proceed with a plan.

Analysis

The analysis process to follow when determining the impact of a technology choice on the environment and humans is complex. It is important to determine the audience for the tool and whether it is appropriate to the intended learning tasks by evaluating the soundness of the idea, the feasibility of implementing the tool, and whether it is ethical to use it based on several factors related to students. The Ethical Choices with Educational Technology (ECET) Instructional Design (ID) technology evaluation choice framework (Beck & Warren, 2022) is one such tool for making this determination before choosing to use a tool (see Figure 1).

Figure 1

ECET Instructional Design (ID) Technology Evaluation Framework



Note the third component of the Ethics lane. This question helps instructional designers determine whether the application uses the tool once or if a sustainable plan exists to continue its use beyond the planned, current lesson. The framework should help instructional designers think through ideas, especially ethically. The addition of the environmental consideration is one small effort to drive sustainability thinking during the educational planning process and to help recognize that ethics should incorporate the environment as a stakeholder if we are to be good stewards of the earth, as proposed by Alfred (2009).

Further, before determining the potential environmental or human harms of adopting technology, designers must know what tool faculty and students will use and at what scale to achieve intended learning outcomes. Each chosen technology will have a different environmental impact depending on its size, raw materials and their source location, manufacturing processes, transportation costs, energy consumption, expected usable tool life, and other variable factors (Su et al., 2019).

Units needed to achieve learning outcomes

Another consideration with the tool choice is the number of units needed to achieve the expected learning outcomes, which can vary significantly based on the scale of the intended learning project. Historically, our educational technology field has pushed for a 1:1 device-to-student ratio because this is the best possible choice for learning outcomes (Stone, 2017). However, this idea fails to consider the environmental costs that result from manufacturing, using, and disposing of devices once they reach their end of life (Yi & Zhang, 2018; Williams, 2004). Each machine that we can avoid making and adopting reduces myriad environmental harms, so minimizing the number needed to achieve learning outcomes should be the first consideration a designer or educator makes.

Consider Environmental Harms from a Device

When considering the technology choice, it is important to consider device construction and the harms in mining, refining, manufacturing, and disposing of a device. Some companies think through reverse logistics with their devices to determine how to reclaim, reuse, recycle, or dispose of a device's materials at its end of life (Sovacool et al., 2020; Rahman & Subramanian, 2012). This information may be found on a manufacturer's website, though not all include it, requiring additional research work on the seeker's part. However, other companies fail to incorporate this thinking in their development planning or intentionally choose materials to make the device as cheaply as possible. Educational environments tend to choose these devices because of the price point. Such practices often result in materials that are more harmful to the environment at some stage in the supply chain.

Additionally, manufacturers intentionally prioritize compacted designs that are harder to break down for recycling or prevent upgrading and to extend usable life, increasing the number of units sold and growing profits at the expense of the environment. Designers and instructors should spend time examining each company's approach to manufacturing devices and look at the materials composition when possible to find and include machines with materials that have the lowest long-term environmental harm at each stage in the mining, manufacturing, transportation, use, and disposal life cycle (Su & Sun, 2019). Even if the immediate cost may be higher, the financial total cost may be lower because of an extended life cycle, or the environmental costs are fewer thanks to reusing, reclaiming, or disposing of safely.

Plan for the Entire Life Cycle of Each Device

Instructional designers and instructors tend to think through what they want from devices and how many will help them achieve instructional outcomes. However, to maintain an environmentally ethical attitude, one's planning should consider the entire life cycle of the device from the moment we choose to use it to how we will lengthen its life and how it will be disposed of safely.

- What are the learning affordances/benefits of the tool?
- What are the material characteristics of the technology?
- How can I minimize my needs with the tool (e.g., energy consumption)?
- How can I use this tool in a variety of ways that provide maximum benefits to the users?
- How can I maximize the life of the tool?
- What is my plan for disposing of these tools (e.g., recycling, safe disposal)?
- What is the plan for ensuring transparency in tool disposal at end-of-life?

If a major goal of taking an ethical attitude is to minimize our environmental impact as educational tool users, only strong planning to reduce our impact can result in reduced harm. These questions act as a starting point for the planning process and ask us to conduct research to identify the consequences of our decisions and actively take steps to mitigate harm. However, as you work through your educational systems and processes, you will likely find new questions. Shifting one's mindset to balancing the benefits with the total costs provides a designer or educator with a fuller perspective on the environmental impacts relative to possible learning improvements. This view considers real-world trade-offs necessary for a holistic ethical view.

Implications, Limitations, and Next Steps

This section reviews practical implications for ethical thinking using an environmental stewardship philosophy during technology planning. From this perspective, we offer practical recommendations for engaging in ethical thinking and active environmental harm reduction. Finally, we note limitations to the stewardship approach and future research that can test the model in the real world.

The First and Most Persistent Question: Should I?

From an ethical perspective, the first question we should ask ourselves before creating a learning plan that requires technology is “Should I?” (Warren & Lin, 2013). Too often, our interest in novel or everyday technologies and what we think they afford drives us to adopt them when less technology-intensive options may be as or more effective. Therefore, a necessary question is whether it is possible to implement the instruction and learning activities without a tool or with one already present. Asking this essential normative question at the outset of our technology and learning planning process can help eliminate potential environmental and human harm.

Practical Recommendations for Environmental Harm Reduction

Before choosing to use a technology, it is important to recognize that there will be some real, measurable harm related to technology adoption. With any device, these may be hidden behind digital ordering walls that obscure them, making them hard to recognize. However, these harms will negatively impact the environment or the people who make them at various points along the supply chain, during transportation to your location, and while using the device. There will be additional quantifiable effects at its end-of-life disposal. As such, we have some recommendations for instructional designers to consider in reducing the harms of technology adoption in any organization, especially educational ones.

Once choosing to adopt new technology as part of a learning plan, we suggest taking steps you may be familiar with from experience, starting with the 3Rs recommended by Mmereki et al. (2016). The first approach is reducing the number of technology units needed or selecting one with a lower pollution footprint. Next, we recommend finding ways to reuse the technology and maximize its value for educational projects throughout the educational setting. Once a technology is no longer usable for its intended purpose, the next strategy should involve recycling materials feasible for repurposing or safe disposal of anything unusable.

Harm Mitigation Strategy 1: Reduce

When deciding how to move forward with an instructional technology implementation that is responsive to reducing negative environmental impacts, it is important to start by

forecasting the minimum number of units needed to achieve learning outcomes successfully. As part of this planning process, one might also consider calculating the environmental impacts of different numbers of units to achieve the required learning outcomes. The goal of this approach is to constrain negative outcomes resulting from technology production, use, and disposal phases (Mmereki et al., 2016). Next, the designer or instructor should consider reducing the need for technology in the plan.

For example, a pure unit reduction approach can work if not all students require laptops concurrently in a social constructivist-based team activity where one student takes notes or records findings, reducing the 37 required units to seven by organizing students into five groups. An added benefit to educational organizations is that this approach reduces implementation costs. By contrast, a lower total environmental cost approach might work if all 35 units are needed. In this case, select options for technology with the lowest energy use and associated pollution and the best physical materials from the lowest impact mining while ensuring units can perform adequately to achieve learning outcomes. A mix of approaches also works; seeking the lowest environmental impact units combined with a unit minimization approach should significantly reduce the project's environmental impact. Once the technology is acquired, the second strategy implemented should ensure that a tool is used for as long as possible so that the environmental impacts from the technology choice have educational benefits for the longest possible period.

Harm Mitigation Strategy 2: Reuse

Three increasingly popular approaches to minimizing the negative impacts of technology on the environment are 1.) repurposing end-of-life electronics equipment (Coughlan et al., 2018) or 2.) taking part in a robust but challenging global shift in mindset to the whole economy and the role of educational institutions in it by adopting the concept of an in-spiral supply chain that complements a circular economy (Valero et al., 2020). The first approach, repurposing equipment, can be done by taking older laptops and using them minimally for activities such as web browsing (i.e., "thin clients"), like how Google Chromebooks are used today (Dino et al., 2020). Another option is to find ways to cheaply improve the internal components of machines that can be modified to extend system life (e.g., add RAM, new hard drive), providing them to students with lower computing needs, such as elementary school children aged 5–12. If the machines are not usable within the institution, participating in the circular economy is another option to reduce negative impacts (Burneo et al., 2020).

Sariatli (2017) explained that "The natural consequence of cheap material / expensive labor is the common neglect of recycling, reusing, and putting much emphasis on waste" (p. 31). Put simply, the take, make and dispose model has had "consequences for society, a negative impact on health and contributes to climate change [. . .] we need a system that functions properly – in which the circular economy replaces the linear" (World Economic Forum, 2019, p. 6). Contrasting with the linear economy, Geng et al. (2012) wrote that the circular economy is "an economy based on a 'spiral-loop system' that minimises [sic] matter, energy flow and environmental deterioration without restricting economic growth or social and technical progress" (p. 281). In the circular economic model, shared value redefines the functions of the world's corporations, for "the purpose of the corporation must be redefined as creating shared value, not just profit per se. This will drive the next wave of innovation and productivity growth in the global economy" (Porter & Kramer, 2018, p. 4), which requires integration of what Ekholm et al. (2016) defined as an ecosystem service-dominant logic. Using this mindset requires considering where any purchased technologies will go next in

the economic or educational system, ensuring they have practical, maximized use value for society until they reach a point at which the materials must be broken back down and repurposed safely again. Another common environmental harm reduction strategy involves recycling as an individual strategy or combined with circular economy participation.

Harm Mitigation Strategy 3: Recycle with Planning, Tracing, and Measuring Impacts

A common recycling strategy schools, universities, and businesses have employed over the last two decades involves selling computers and other technologies that reach their end-of-life at low prices to private companies expected to recycle them (Gavronski et al., 2012). However, as we find in our institutions and others contacted, once selling these devices through an organization's facilities surplus unit or online partner, the chain of custody for that device ends. This problem results from a lack of recycling policy coordination across global supply chains among companies or governments (Sovacool et al., 2020) and couples with minimal transparency in the e-waste supply chain at end of life (Chen et al., 2019). In other words, we cannot trace these devices' locations and whether they are disposed of safely when they reach their final destination (Kumar et al., 2017). Further, even pyrolysis may not successfully reclaim plastics most commonly recycled, as common mechanical treatments do not work on plastics found in computers (Qureshi et al., 2020). As such, the instructional designer or instructor should work with their institution and community to develop a robust plan for recycling that includes a chain of custody extending to where the device is successfully recycled or disposed of without environmental harm.

Harm Mitigation Strategy 4: Plan to Dispose of Non-Recyclables Safely

There is little evidence that most educational institutions have plans for effective, safe disposal of non-recyclable components of electronic devices, meaning many devices end up in landfills. Further, well-intentioned technology planners know there are parts of even the most environmentally friendly computers that end up as pure e-waste that must be disposed of safely. Current laws in many countries fail to account for this challenge, so there is no guarantee of minimized harm when disposing of a machine that cannot be recycled. As a result, people in countries like India, China, Vietnam, and some African Countries (Tran & Salfhofer, 2018; Sivramanan, 2013; Gaidajis et al., 2010), who are involved in the process of stripping electronics for valuable metals, are harmed through informal end-processing of e-waste (Sankhla et al., 2016; Song & Li, 2014). Those countries often have few resources for mitigating environmental damage to the local earth, water, and air (Dino et al., 2020). However, China instituted its National Sword policy in 2018, reducing the amount of technology imported for recycling (Tian et al., 2021). This change has had consequences for countries like the U.S. and the U.K., where our recycling strategy for the last two decades has primarily been to ship our e-waste to other countries, leaving many communities and organizations with poor sustainable waste disposal strategies. It was only at the end of 2021 that the United States Environmental Protection Agency (EPA) announced a national recycling strategy focused on growing markets for waste, increasing material collection, reducing materials contamination, improving policies and programs nationally and internationally, and standardizing measures of recycling performance in communities, especially those carrying an unfair burden of the environmental costs of waste (United

States Environmental Protection Agency, 2021). In the waste disposal and recycling planning domain, the field of conservation engineering spent the last two decades seeking to understand and model solutions for the safe disposal of toxic materials left over from technologies once they reach the end of usable life (Sovacool et al., 2022; Su & Sun, 2019; Williams, 2004; Joshi, 1999); however, that will be the focus of future studies.

Future Research

In the future, the field should research the growing problem of electronic waste left behind by instructional technology users and how successful educational institutions plan and operationalize their safe disposal strategies. For example, a single K-12 school district that adopts a 1:1 laptop initiative generates a minimum of 55 tons of e-waste every three years from the computers alone (Warren et al., 2022a). Further, there is no research on the e-waste and energy consumption of the many higher education institutions in the U.S. or globally, which leaves a gap in our knowledge about how we can reduce their likely negative environmental impacts through restructuring of educational facilities and technology used in support of their educational missions through the adoption of sustainable planning and energy production (Warren et al., 2022b). We know little about the environmental impacts of current K-12 or higher education sustainability policy on real-world ecosystem outcomes. Given this need, scholars should focus on how school districts cope safely with the waste generated from these initiatives. Such plans should address increased rising financial costs of technology and energy that continue to increase in response to global supply chain challenges due to cyber threats, climate impacts, decreased access to natural resources, high shipping costs, skilled worker shortages, and competition for labor (Er Kara, 2021; Crimmins et al., 2016; Manuj & Mentzer, 2008). In addition, it is important to understand whether instructional designers and educational managers (e.g., principals, higher education administrators, etc.) believe they have an ethical responsibility to consider the environment in their development planning, along with considerations of learning outcomes. Better understanding designers' perspectives can guide how we develop future training on how to incorporate an environmentally ethical perspective in the technology adoption planning process of which we are a part, helping shift mindsets from that of perceived neutral tool users to stewards of sensitive global resources with intrinsic value that should be protected.

Limitations

While centered on instructional designers and their ethical decision-making, this chapter rapidly covers highly complex manufacturing, environmental philosophy, and conservation engineering concepts. As such, we simplify concepts to help instructional designers and managers of technology become broadly aware of environmental and technological challenges; however, future work, communication, and ethical behaviors will benefit from exploring each topic.

Further, exploration of the supply chain's environmental impacts was limited to a single, small classroom to illustrate the principles. The framework requires testing in many contexts to determine its applicable value. We do not advocate for generalizing the framework to other settings or provide precise mathematical equations for calculating the total cost of ownership. A single laptop device has many variables (e.g., laptop construction materials, power use, energy source type, etc.), so our equations aimed to illustrate the complexity

inherent in making an environmentally ethical choice about whether and what technology to adopt in education settings.

Conclusion

Having an ethical attitude towards the environmental impacts of technology requires understanding the complexity involved in their creation, transportation, use, and disposal chain. As such, there is value and a need to understand the environmental impacts of adopting a new technology beyond immediate use and potential learning affordances. As Hill (2017) explained, an ethical attitude toward educational technology can be conceived of by understanding that "[E]nvironmental protection means – or should mean – reducing pollution, making sustainable choices, and distributing the burdens and benefits of industrialization fairly among all populations, considering their current situations, their contribution to the harms being addressed, and the resources available to them" (p. 3). A major goal of this chapter was to illustrate the environmental harms inherent in our technologies and model how we can consider systematically reducing them during our instructional development process. By viewing environmental and human costs as part of an educational technology's total cost of ownership, instructional designers and educational managers should have a better sense of unaccounted-for costs that go beyond the immediate financial ones central to everyday decision-making. Using these models that integrate costs hidden behind ordering screens, whether for a single computer or a university-wide device adoption from a new vendor, we can better understand the complex outcomes of seemingly ethically neutral choices and make better decisions for now and the future.

References

Agana, B. A., Reeve, D., & Orbell, J. D. (2013). An approach to industrial water conservation - A case study involving two large manufacturing companies based in Australia. *Journal of Environmental Management, 114,* 445–460. https://doi.org/10.1016/j.jenvman.2012.10.047

Alfred, T. (2009). *Peace, power, and righteousness: An indigenous manifesto* (2nd ed.). Oxford University Press.

Amaral-Zettler, L. (2019). Plastics: Colonization and degradation. In T. M. Schmidt (Ed.) *Encyclopedia of microbiology* (4th ed., 639–644). Elsevier Science & Technology. https://doi.org/10.1016/B978-0-12-809633-8.90685-X

Asiedu, Y., & Gu, P. (1998). Product life cycle cost analysis: State of the art review. *International Journal of Production Research, 36*(4), 883–908. https://doi.org/10.1080/002075498193444

Babu, B. R., Parande, A. K., & Basha, C. A. (2007). Electrical and electronic waste: A global environmental problem. *Waste Management and Research, 25*(4), 307–318. https://doi.org/10.1177/0734242X07076941

Bakhshi, R., & Sandborn, P. A. (2018). A return on investment model for the implementation of new technologies on wind turbines. *IEEE Transactions on Sustainable Energy, 9*(1), 284–292. https://doi.org/10.1109/TSTE.2017.2729505

Baloyi, N. D., Tekere, M., Maphangwa, K. W., & Masindi, V. (2021). Insights Into the Prevalence and Impacts of Phthalate Esters in Aquatic Ecosystems. *Frontiers in Environmental Science, 9*. https://doi.org/10.3389/fenvs.2021.684190

Beck, D., & Warren, S. (2020). ECET: A proposed framework to guide ethical instructor choices with learning technologies. *Association for Educational Communications & Technology*. https://convention2.allacademic.com/one/aect/aect20/index.php?cmd=Online+Program+View+Session&selected_session_id=1697338&PHPSESSID=v2ehlnunjt2pgqr0p2sh9rq1nq

Belkhir, L., & Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 & recommendations. *Journal of Cleaner Production, 177*, 448–463. https://doi.org/10.1016/j.jclepro.2017.12.239

Bretzler, A., Lalanne, F., Nikiema, J., Podgorski, J., Pfenninger, N., Berg, M., & Schirmer, M. (2017). Groundwater arsenic contamination in Burkina Faso, West Africa: Predicting and verifying regions at risk. *Science of the Total Environment, 15*, 958–970. https://doi.org/10.1016/j.scitotenv.2017.01.147

Brigden, K., Webster, J., Labunska, I., & Santillo, D. (2007). Toxic chemicals in computers reloaded toxic chemicals in computers reloaded. *Greenpeace Research Laboratories*. https://www.greenpeace.org/usa/research/toxic-chemicals-in-computers-r/

Brodny, J., & Tutak, M. (2020). The use of artificial neural networks to analyze greenhouse gas and air pollutant emissions from the mining and quarrying sector in the European Union. *Energies, 13*(8), 1925. https://doi.org/10.3390/en13081925

Burneo, D., Cansino, J. M., & Yñiguez, R. (2020). Environmental and socioeconomic impacts of urban waste recycling as part of circular economy. The case of Cuenca (Ecuador). *Sustainability, 12*(8). https://doi.org/10.3390/SU12083406

Caddy, I. N., & Helou, M. M. (2007). Supply chains and their management: Application of general systems theory. *Journal of Retailing and Consumer Services, 14*(5), 319–327. https://doi.org/10.1016/j.jretconser.2006.12.001

Chan, N. W., & Morrow, J. W. (2019). Unintended consequences of cap-and-trade? Evidence from the Regional Greenhouse Gas Initiative. *Energy Economics, 80*, 411–422. https://doi.org/10.1016/j.eneco.2019.01.007

Chen, S., Zhang, Q., & Zhou, Y. P. (2019). Impact of supply chain transparency on sustainability under NGO scrutiny. *Production and Operations Management, 28*(12), 3002–3022. https://doi.org/10.1111/poms.12973

Chopra, S., & Meindl, P. (2010). *Supply chain management: Strategy, planning, and operation*. Pearson Education.

Clift, R., Sim, S., King, H., Chenoweth, J. L., Christie, I., Clavreul, J., Mueller, C., Posthuma, L., Boulay, A. M., Chaplin-Kramer, R., Chatterton, J., DeClerck, F., Druckman, A., France, C., Franco, A., Gerten, D., Goedkoop, M., Hauschild, M. Z., Huijbregts, M. A. J., . . . Murphy, R. (2017). The challenges of applying planetary boundaries as a basis for strategic decision-making in companies with global supply chains. *Sustainability, 9*(2), 279. https://doi.org/10.3390/su9020279

Coughlan, D., Fitzpatrick, C., & McMahon, M. (2018). Repurposing end of life notebook computers from consumer WEEE as thin client computers – A hybrid end of life strategy for the Circular Economy in electronics. *Journal of Cleaner Production, 192*, 809–820. https://doi.org/10.1016/j.jclepro.2018.05.029

Crimmins, A., Balbus, J., Gamble, C., Beard, J., Bell, D., Dodgen, R., Eisen, N., Fann, M., Hawkins, S., Herring, L., Jantarasami, D., Mills, S., Saha, M., Sarofim, J., Trtanj, J., & Ziska, L. (2016). The impacts of climate change on human health in the United States: A scientific assessment. *U.S. Global Change Research Program*. http://dx.doi.org/10.7930/J0R49NQX

De Clerck, Q., van Lier, T., Messagie, M., Macharis, C., Van Mierlo, J., & Vanhaverbeke, L. (2018). Total cost for society: A persona-based analysis of electric and conventional vehicles. *Transportation Research Part D: Transport and Environment, 64*, 90–110. https://doi.org/10.1016/j.trd.2018.02.017

Dino, G. A., Cavallo, A., Rossetti, P., Garamvölgyi, E., Sándo, R., & Coulon, F. (2020). Towards sustainable mining: Exploiting raw materials from extractive waste facilities. *Sustainability, 12*(6), 2383. https://doi.org/10.3390/su12062383

Ekener-Petersen, E., & Finnveden, G. (2013). Potential hotspots identified by social LCA—Part 1: A case study of a laptop computer. *International Journal of Life Cycle Assessment, 18*(1), 127–143. https://doi.org/10.1007/s11367-012-0442-7

Ekholm, T., Matthies, B. D., Amato, D. D., Bergh, S., Mattila, O., Toppinen, A., Valsta, L., Wang, L., & Yousefpour, R. (2016). An ecosystem service-dominant logic? Integrating the ecosystem service approach and the service-dominant logic. *Journal of Cleaner Production, 124*, 51–64. https://doi.org/10.1016/j.jclepro.2016.02.109

Ellram, L. M. (1995). Total cost of ownership; An analysis approach for purchasing. *International Journal of Physical Distribution & Logistics Management, 25*(8), 4–23. https://doi.org/10.1108/09600039510099928

Er Kara, M., Ghadge, A., & Bititci, U. S. (2021). Modelling the impact of climate change risk on supply chain performance. *International Journal of Production Research, 59*(24), 7317–7335. https://doi.org/10.1080/00207543.2020.1849844

Esoimeme, E. E. (2020). Using the risk-based approach to curb modern slavery in the supply chain: The Anglo American and Marks and Spencer example. *Journal of Financial Crime, 27*(2), 313–322. https://doi.org/10.1108/JFC-05-2019-0056

Flexer, V., Baspineiro, C. F., & Galli, C. I. (2018). Lithium recovery from brines: A vital raw material for green energies with a potential environmental impact in its mining and processing. *Science of the Total Environment, 639*, 1188–1204. https://doi.org/10.1016/j.scitotenv.2018.05.223

Gaidajis, G., Angelakoglou, K., & Aktsoglou, D. (2010). E-waste: Environmental problems and current management engineering science and technology review. *Journal of Engineering Science and Technology Review, 3*(1), 193–199. http://www.jestr.org/downloads/volume3/fulltext342010.pdf

Gavronski, I., Klassen, R. D., Vachon, S., & Nascimento, L. F. M. H. Do. (2012). A learning and knowledge approach to sustainable operations. International *Journal of Production Economics, 140*(1), 183–192. https://doi.org/10.1016/j.ijpe.2012.01.037

Geng, Y., Fu, J., Sarkis, J., & Xue, B. (2012). Towards a national circular economy indicator system in China: An evaluation and critical analysis. *Journal of Cleaner Production, 23*(1), 216–224. https://doi.org/10.1016/j.jclepro.2011.07.005

Glodek, A., Panasiuk, D., & Pacyna, J. M. (2010). Mercury emission from anthropogenic sources in Poland and their scenarios to the year 2020. *Water, Air, and Soil Pollution, 213*, 227–236. https://doi.org/10.1007/s11270-010-0380-6

Groot, J., Bing, X., Bos-Brouwers, H., & Bloemhof-Ruwaard, J. (2014). A comprehensive waste collection cost model applied to post-consumer plastic packaging waste. *Resources, Conservation and Recycling, 85*, 79—87. https://doi.org/10.1016/j.resconrec.2013.10.019

Gueudré, T., Dobrinevski, A., & Bouchaud, J. P. (2014). Explore or exploit? A generic model and an exactly solvable case. *Physical Review Letters, 112*(5), 1–5. https://doi.org/10.1103/PhysRevLett.112.050602

Hill, P. (2017). *Environmental protection: What everyone needs to know*. Oxford University Press. https://scholarship.law.bu.edu/books/337

James, G. A. (2013). *Ecology is permanent economy: The activism and environmental philosophy of Sunderlal Bahuguna*. SUNY Press. https://sunypress.edu/Books/E/Ecology-Is-Permanent-Economy

Jayaraman, K., Vejayon, S., Raman, S., & Mostafiz, I. (2019). The proposed e-waste management model from the conviction of individual laptop disposal practices-An empirical study in Malaysia. *Journal of Cleaner Production, 208*, 688–696. https://doi.org/10.1016/j.jclepro.2018.10.125

Jeong, H., Choi, J. Y., & Ra, K. (2021). Potentially toxic elements pollution in road deposited sediments around the active smelting industry of Korea. *Scientific Reports, 11*(1), 1–13. https://doi.org/10.1038/s41598-021-86698-x

Joshi, S. (1999). Product Environmental Life-Cycle Assessment Using Input-Output Techniques. *Journal of Industrial Ecology, 3*(2–3), 95–120. https://doi.org/10.1162/108819899569449

Kahl, A. (2016). *Introduction to environmental engineering*. Momentum Press.

Kasulaitis, B. V., Babbitt, C. W., Kahhat, R., Williams, E., & Ryen, E. G. (2015). Evolving materials, attributes, and functionality in consumer electronics: Case study of laptop computers. *Resources, Conservation and Recycling, 100*, 1–10. https://doi.org/10.1016/j.resconrec.2015.03.014

Kitila, A. W. (2015). Electronic waste management in educational institutions. *International Journal of Sciences: Basic and Applied Research, 24*(4), 319–331. https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/4587

Lenhardt, J., Chen, K., & Schiffmann, W. (2017). Energy-Efficient Web Server Load Balancing. *IEEE Systems Journal, 11*(2), 878–888. https://doi.org/10.1109/JSYST.2015.2465813

Leuenberger, A., Dietler, D., Lyatuu, I., Farnham, A., Kihwele, F., Brugger, F., & Winkler, M. S. (2021). Water and health in mining settings in sub-Saharan Africa: A mixed methods geospatial visualization. *Geospatial Health, 16*(1). https://doi.org/https://doi.org/10.4081/gh.2021.965

Levinson, A. (2009). Technology, international trade, and pollution from US manufacturing. *American Economic Review, 99*(5), 2177–2192. https://doi.org/10.1257/aer.99.5.2177

Li, Y., & Zhang, M. (2018). Green manufacturing and environmental productivity growth. *Industrial Management and Data Systems, 118*(6), 1303–1319. https://doi.org/10.1108/IMDS-03-2018-0102

Liu, Z., Geng, Y., Adams, M., Dong, L., Sun, L., Zhao, J., Dong, H., Wu, J., & Tian, X. (2016). Uncovering driving forces on greenhouse gas emissions in China' aluminum industry from the perspective of life cycle analysis. *Applied Energy, 166*, 253–263. https://doi.org/10.1016/j.apenergy.2015.11.075

Long, J. (2021). Crisis capitalism and climate finance: The framing, monetizing, and orchestration of resilience-amidst-crisis. *Politics and Governance, 9*(2), 51–63. https://doi.org/10.17645/pag.v9i2.3739

Lusher, A., Hollman, P., & Mendozal, J. (2017). Microplastics in fisheries and aquaculture: Status of knowledge on their occurrence and implications for aquatic organisms and food safety. *Food and Agriculture Organization of the United Nations*. https://www.fao.org/documents/card/fr/c/59bfa1fc-0875-4216-bd33-55b6003cfad8/

Manuj, I., & Mentzer, J. T. (2008). Global supply chain risk management strategies. *International Journal of Physical Distribution and Logistics Management, 38*(3), 192–223. https://doi.org/10.1108/09600030810866986

Marjovvi, A., Soleimani, M., Mirghaffari, N., Karimzadeh, H., Yuan, Y., & Fang, L. (2022). Monitoring, Source identification and environmental risk of potentially toxic elements of dust in Isfahan Province, Central Iran. *Bulletin of Environmental Contamination and Toxicology, 108*, 901–908. https://doi.org/10.1007/s00128-021-03446-7

McKenna, S. (2011). A critical analysis of North American business leaders' neocolonial discourse: Global fears and local consequences. *Organization, 18*(3), 387–406. https://doi.org/10.1177/1350508411398728

Mmereki, D., Li, B., Baldwin, A., & Hong, L. (2016). The generation, composition, collection, treatment and disposal system, and impact of e-waste. In F.-C. Mihai (Ed.), *E-Waste in transition* (1st ed., pp. 65–93). InTechOpen. https://doi.org/10.5772/61332

Moore, S. (2013). Ethics as design: Rethinking professional ethics as part of the design domain. In B. Hokanson & A. Gibbons (Eds.), *Design in educational technology* (pp. 185–204). Springer. https://doi.org/10.1007/978-3-319-00927-8_11

Morgott, D. A. (2018). The human exposure potential from propylene releases to the environment. *International Journal of Environmental Research and Public Health, 15*(1), 66. https://doi.org/10.3390/ijerph15010066

New, S. J. (2015). Modern slavery and the supply chain: the limits of corporate social responsibility? *Supply Chain Management, 20*(6), 697–707. https://doi.org/10.1108/SCM-06-2015-0201

Newbert, S. L. (2007). Empirical research on the resource-based view of the firm: An assessment and suggestions for future research. *Strategic Management Journal, 28*(2), 121–146. https://doi.org/10.1002/smj.573

Nuss, P., & Eckelman, M. J. (2014). Life cycle assessment of metals: A scientific synthesis. *PLoS ONE, 9*(7). https://doi.org/10.1371/journal.pone.0101298

O'Reilly, C., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present and future. *Academy of Management Perspectives, 27*(4), 324–338. https://doi.org/10.5465/amp.2013.0025

Park, Y., Meng, F., & Baloch, M. A. (2018). The effect of ICT, financial development, growth, and trade openness on CO2 emissions: an empirical analysis. *Environmental Science and Pollution Research, 25*(30), 30708–30719. https://doi.org/10.1007/s11356-018-3108-6

Phillips, J. (2016). Climate change and surface mining: A review of environment-human interactions & their spatial dynamics. *Applied Geography, 74*, 95–108. https://doi.org/10.1016/j.apgeog.2016.07.001

Porter, M.E., Kramer, M.R. (2019). Creating shared value. In G. G. Lenssen, & N. C. Smith (Eds.). *Managing sustainable business*. Springer. https://doi.org/10.1007/978-94-024-1144-7_16

Qureshi, M. S., Oasmaa, A., Pihkola, H., Deviatkin, I., Tenhunen, A., Mannila, J., Minkkinen, H., Pohjakallio, M., & Laine-Ylijoki, J. (2020). Pyrolysis of plastic waste: Opportunities and challenges. *Journal of Analytical and Applied Pyrolysis, 152*. https://doi.org/10.1016/j.jaap.2020.104804

Rahman, S., & Subramanian, N. (2012). Factors for implementing end-of-life computer recycling operations in reverse supply chains. *International Journal of Production Economics, 140*(1), 239–248. https://doi.org/10.1016/j.ijpe.2011.07.019

Rezza, A. A. (2013). FDI and pollution havens: Evidence from the Norwegian manufacturing sector. *Ecological Economics, 90*, 140–149. https://doi.org/10.1016/j.ecolecon.2013.03.014

Sankhla, M. S., Kumari, M., Nandan, M., Mohril, S., Singh, G. P., Chaturvedi, B., & Kumar, D. R. (2016). Effect of electronic waste on environmental & human health–A Review. *IOSR Journal of Environmental Science, Toxicology and Food Technology, 10*(09), 98–104. https://doi.org/10.9790/2402-10090198104

Sariatli, F. (2017). Linear economy versus circular economy: A comparative and analyzer study for optimization of economy for sustainability. *Visegrad Journal on Bioeconomy and Sustainable Development, 6*(1), 31–34. https://doi.org/10.1515/vjbsd-2017-0005

Simmons, D. (2015). Instructional Engineering Principles to Frame the Future of Reading Intervention Research and Practice. *Remedial and Special Education, 36*(1), 45–51. https://doi.org/10.1177/0741932514555023

Singhal, R., Singhal, A., & Sharma, V. (2019). E-cloud: A solution towards E-waste management for educational institutions. *International Journal of Recent Technology and Engineering, 8*(2), 964–972. https://doi.org/10.35940/ijrte.B1184.0782S619

Sivaramanan, S. (2013). E-waste management, disposal, and its impacts on the environment. *Universal Journal of Environmental Research and Technology, 3*(5), 531–537. https://www.environmentaljournal.org/3-5/ujert-3-5-1.pdf

Soltan, L. (n.d.). Technology depleting resources and pollution. *Digital responsibility*. http://www.digitalresponsibility.org/technology-depleting-resources-and-pollution

Song, Q., & Li, J. (2014). A systematic review of the human body burden of e-waste exposure in China. *Environment International 68*, 82–93. https://doi.org/10.1016/j.envint.2014.03.018

Sovacool, B. B. K., Ali, S. H., Bazilian, M., Radley, B., Nemery, B., Okatz, J., & Mulvaney, D. (2020). Policy coordination is needed for global supply chains. *Science, 367*(6473), 30–33. https://doi.org/10.1126/science.aaz6003

Sovacool, B. K., Upham, P., & Monyei, C. G. (2022). The “whole systems” energy sustainability of digitalization: Humanizing the community risks and benefits of Nordic datacenter development. *Energy Research and Social Science, 88*, 102493. https://doi.org/10.1016/j.erss.2022.102493

Stone, J. A. (2017). The impact of technology exposure on student perceptions of a 1:1 program. *Education and Information Technologies, 22*(5), 2281–2309. https://doi.org/10.1007/s10639-016-9541-6

Su, Y., & Sun, W. (2019). Analyzing a closed-loop supply chain considering environmental pollution using the NSGA-II. *IEEE Transactions on Fuzzy Systems, 27*(5), 1 066–1074. https://doi.org/10.1109/TFUZZ.2018.2870693 .

Tian, X., Zheng, J., Hu, L., Liu, Y., Wen, H., & Dong, X. (2021). Impact of China's waste import policy on the scrap copper recovery pattern and environmental benefits. *Waste Management, 135*, 287–297. https://doi.org/10.1016/j.wasman.2021.09.008

Tran, C. D., & Salhofer, S. P. (2018). Processes in informal end-processing of e-waste generated from personal computers in Vietnam. *Journal of Material Cycles and Waste Management, 20*(2), 1154–1178. https://doi.org/10.1007/s10163-017-0678-1

Tutak, M., & Brodny, J. (2019). Forecasting methane emissions from hard coal mines including the methane drainage process. *Energies, 12*(20). https://doi.org/10.3390/en12203840

United Nations University. (2004). Computer manufacturing soaks up fossil fuels, UN University study says. *UN News.* https://news.un.org/en/story/2004/03/96452-computer-manufacturing-soaks-fossil-fuels-un-university-study-says

United States Energy Information Administration. (2021). U.S. Energy Information Administration Frequently Asked Questions (FAQS). *United States Department of Energy*. https://www.eia.gov/tools/faqs/faq.php?id=74&t=11

United States Environmental Protection Agency. (2020). *Greenhouse gas equivalencies calculator*. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Valero, A., & Valero, A. (2020). Thermodynamic rarity and recyclability of raw materials in the energy transition: The need for an in-spiral economy. *Entropy, 21*(9), 1–14. https://doi.org/10.3390/e21090873

Wang, J., Chen, G., Christie, P., Zhang, M., Luo, Y., & Teng, Y. (2015). Occurrence and risk assessment of phthalate esters (PAEs) in vegetables and soils of suburban plastic film greenhouses. *Science of the Total Environment, 523*, 129–137. https://doi.org/10.1016/j.scitotenv.2015.02.101

Wang, F., Huisman, J., Meskers, C. E. M., Schluep, M., Stevels, A., & Hagelüken, C. (2012). The Best-of-2-Worlds philosophy: Developing local dismantling and global infrastructure network for sustainable e-waste treatment in emerging economies. *Waste Management, 32*(11), 2134–2146. https://doi.org/10.1016/j.wasman.2012.03.029

Warren, S. J., & Lin, L. (2012). Ethical considerations for learning game, simulation, and virtual world design and development. In S. C. Yang, H. H., & Yuen (Ed.), *Practices and outcomes in virtual worlds and environments* (pp. 1–18). IGI Global. https://doi.org/10.4018/978-1-60960-762-3.ch001

Warren, S. J., Moran, S., & McGuffin, K. (2022a). Unintended consequences of technology: Impacts of school technology adoption on operations, waste, and organizational sustainability. In F. Sabin, B. Bichesuu, R. Mallipeddi, & R. Zanjirani Farahani (Eds.),

Production and Operations Management Society Conference. Production and Operations Management Society (POMS). https://pomsmeetings.org/conf-2022/

Warren, S., Moran, S., & McGuffin, K. (2022b). Planning to incorporate energy conservation practices, renewable energy production systems, and ecofriendly building design practices to support sustainability in US public schools. In E. Zio, P. Pardalos, M. Fathi, & Khakifirooz (Eds.), *Handbook of smart energy systems*. Springer. https://doi.org/10.1007/978-3-030-72322-4_4-1

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management, 5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Williams, E. (2004). Energy intensity of computer manufacturing: Hybrid assessment combining process and economic input - Output methods. *Environmental Science and Technology, 38*(22), 6166–6174. https://doi.org/10.1021/es035152j

World Economic Forum. (2019). *A new circular vision for electronics: Time for a global reboot.* https://wedocs.unep.org/20.500.11822/32762

Zachariassen, F., & Arlbjørn, J. S. (2011). Exploring a differentiated approach to total cost of ownership. *Industrial Management & Data Systems, 111*(3), 448–469. https://doi.org/10.1108/02635571111118305

Zhang, W., Li, H., Chen, B., Li, Q., Hou, X., & Zhang, H. (2015). CO2 emission and mitigation potential estimations of China's primary aluminum industry. *Journal of Cleaner Production, 103*, 863–872. https://doi.org/10.1016/j.jclepro.2014.07.066

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The Imperfection of Accessibility in Instructional Design: An Ethical Dilemma

Lomellini, A. , Reese, R. M. , & Grennell, K.

The increasing attention to accessibility in online learning, driven by societal awareness shifts, growing disclosure of disabilities among learners, the rise of online education, and legal pressures, underscores the imperative for instructional designers (IDs) to prioritize accessibility from the outset of course design. However, IDs face ethical challenges related to legal mandates, technological advancements, resource limitations, institutional expectations of quality, and the pursuit of perfection in accessibility, which can lead to feelings of intimidation or failure. We propose an iterative, flexible, and reflective design approach incorporating accessibility as a core tenet to drive progress and reduce fixation on perfection. The chapter explores specific ethical considerations for accessible online course design, promoting a "progress over perfection" mentality, which entails learning from mistakes, refining ideas through

iteration, and remaining open to alternative approaches.

Introduction: Embracing improvement instead of pursuing perfection

Accessibility in online learning has continued to gain attention in recent years (Fenneberg, 2022; Lewicki-Townley et al., 2021; Oyarzun et al., 2021). This may be due to a combination of factors including a societal shift in awareness of accessibility, an increase in learners disclosing disabilities (NCES, 2016, 2019), the growth and reliance on online learning (Garrett et al., 2022), and recent legal pressures (U.S. Department of Justice, 2023). This increased attention highlights the need for instructional designers (IDs) to consider accessibility in their online course designs from the start. However, there has been limited research into instructional designers' role, responsibilities, ethical considerations, and processes in accessible online course design (Lomellini et al., in press; Singleton et al., 2019).

Instructional designers must navigate ethical challenges associated with legal mandates for accessibility, technological advances, limited resource allocation, and the need to ensure an inclusive educational experience for all learners. On one hand, institutions are legally mandated to ensure accessibility for all students. Alternately, instructional designers grapple with the practical reality that achieving “perfection” in accessibility can be a challenging and, at times, unattainable goal. When accessibility is thought of in terms of all-or-nothing, it often results in instructional designers feeling intimidated, overwhelmed, or as if they have failed in some way if they do not achieve totality. More research on the impact of the increased ethical and legal pressures on IDs to create accessible online learning environments is warranted. We argue for a more iterative, flexible, and reflective design-based approach incorporating accessibility as a core tenet to drive progress and reduce the preoccupation with perfection.

Avoiding bias in design and conducting ethical design practices is a much-discussed topic in the field of human-computer interaction (HCI). Friedman and Hendry (2019) argue for clear goals across human-centered professions in the use of broad and more flexible design methods. The scope of ethics in accessibility extends beyond merely reacting to specific issues; instead, it asks professionals to take a proactive and intentional approach. Significantly, the ethical obligation for IDs is to make adjustments that are not contingent on the presence of disabled learners but rather to consider the inevitable diversity of learners (Meyer et al., 2014). However, the current instructional theories and models of practice often do not consider the ethical role of IDs in creating equitable and inclusive futures.

Often stakeholders including faculty, leadership, and even IDs contend that accessibility remediations should wait for a person with a disability to request accommodations. This perspective is problematic for several reasons. The reactive approach places the burden on

the individual to disclose a disability and go through an often convoluted and lengthy process to obtain accommodations that may be limited by institutional resources (De Los Santos et al., 2019; Friedensen et al., 2021). Assuming that all learners will request accommodations overlooks the reality that some may not or do not feel comfortable making this type of request due to stigma, discrimination, lack of diagnoses, not wanting to be treated differently, etc. (Black et al., 2015; Smith et al., 2021). This can lead to their needs being unmet. If a student chooses to disclose their disability, any delays in accommodations can impede their ability to stay current in the course. Retrofitting courses for accessibility can be more time-consuming and costly than integrating accessibility from the start. By building accessible content initially, designers prevent delays in the delivery of course materials and disruptions to the learning experience for those learners with disabilities. A proactive approach ensures that all learners, including those with disabilities, have equitable access to educational materials at the outset. This shift in approach aligns with the principles of UDL, which advocates for creating learning environments that are accessible and reducing the need for individual accommodations (Meyer et al., 2014).

Designing courses with accessibility in mind from the beginning also promotes a culture of inclusivity and respects the diversity of learners. It acknowledges that disabilities are a part of human variation and that accessible design benefits all learners (Meyer et al., 2014). For example, adding closed captions to videos can aid learners who have a different first language than the video content, viewing in noisy environments, as well as learners with hearing impairments. Overall, waiting for requests to provide accommodations to learners is insufficient, ineffective, and potentially discriminatory. Proactive design promotes equity, reduces barriers for all learners, and acknowledges the diverse needs of the student population from the outset.

Despite the increased attention on proactively creating accessible online learning to meet diverse learners' needs, research into the processes and implications for instructional designers remains limited. In this chapter we explore the ethical considerations that guide IDs to actively incorporate the perspectives and needs of disabled individuals, demystifying the decision process, and navigating considerations made during development. Our aim is the need for genuine commitment towards online learning that fosters an inclusive environment where every individual has the opportunity to thrive. We analyze specific ethical issues surrounding accessible online course design and guide IDs to embrace a “progress over perfection” mentality. In practical terms, prioritizing progress over the action of perfection involves distinguishing between achievable tasks and working towards them. This entails embracing lessons from our mistakes, refining our ideas through iteration, and maintaining openness to alternative approaches.

Legal Mandates

Legal mandates are an often cited driver for accessibility initiatives (Katsiyannis, et al. 2009). Educational institutions are required by law to comply with legal frameworks such as the Americans with Disabilities Act (ADA) and Sections 504 and 508 of the Rehabilitation Act. Title II of the ADA prohibits discrimination on the basis of disability by public entities,

including public colleges and universities. This includes ensuring that electronic and information technology is accessible to individuals with disabilities, such as providing access to online course materials. Section 504 prohibits discrimination on the basis of disability in federally funded programs, including public universities. It requires institutions to ensure that individuals with disabilities have equal access to educational programs and activities offered by the institution, including those conducted online. Section 508, which applies to institutions receiving federal funding, sets standards for the accessibility of electronic and information technology, including websites, for individuals with disabilities. In 2023, the U.S. Department of Justice issued a "Dear Colleague" letter reiterating the importance of complying with these accessibility laws. Accessibility laws are generally aligned with the Web Content Accessibility Guidelines (WCAG), a set of highly technical guidelines developed by the World Wide Web Consortium (W3C) to make web content more accessible.

Legal mandates and guidelines, while an essential step to close the equity gap for people with disabilities, can also reduce the complexity of accessibility to a simplistic yes/no with a negative effect on the overall implementation of instructional design. It can lead instructional designers and other stakeholders to assume that content is either accessible or it is not. This type of all-or-nothing perspective limits the potential for progress and incremental steps toward more accessible design.

The Challenges of Imperfect Accessibility

Instructional designers in higher education face various challenges when seeking to comply with laws and align online course design with WCAG (Gronseth, 2018). First, WCAG is highly technical and at a minimum, requires knowledge of HTML and ARIA, making it difficult for instructional designers to interpret. Second, Instructional designers are rarely taught more than an introductory lesson in accessible course design and potential frameworks that create accessible and inclusive online learning in preparatory programs (Lomellini & Lowenthal, 2022; Singleton et al., 2019). Research also suggests a lack of accessible course design as a core competency in instructional design job frameworks (e.g., IBSTPI, 2012; Klein & Kelly, 2018; Kumar & Ritzhaupt, 2017; Lowenthal et al., 2021; Ritzhaupt et al. 2021). Further complicating matters, IDs often collaborate with faculty members who also have varying levels of awareness and training in accessibility principles (Oyarzun et al., 2021).

Ensuring instructors understand the importance of accessibility and possess the skills to implement changes can be a persistent challenge for IDs. Assisting instructors in this regard can include ongoing professional development that enhances instructors' skills and knowledge in creating accessible online content (Singleton et al., 2019; Westine et al., 2019). Instructors are subject matter experts but may not have the opportunity or resources to develop the knowledge, skills, and pedagogical strategies to incorporate accessibility best practices into their course designs (Burgstahler, 2022; Xie & Rice, 2021). Instructional designers are thus faced with the ethical dilemma of preserving their relationships with

faculty to efficiently collaborate on the overall course design or risk that relationship by pushing specifically for more accessibility. For example, a recent study conducted by Xie et al. (2021) suggested that advocating for accessible online course design can lead to strain in the collaboration between faculty and instructional designers. This tension is attributed to faculty members' misconceptions about disability and a reluctance to embrace changes in teaching methodologies. Focusing on adaptability, flexibility, open-mindedness, and empowerment should be at the core of any effort to change mindsets or approaches towards accessibility.

In cases where existing online courses must be retroactively aligned with WCAG standards, instructional designers encounter the challenge of addressing legacy content that may not have been initially designed with accessibility in mind. Reconstructing courses to meet WCAG requirements can be labor-intensive, and may require creative solutions to balance the need for accessibility with the constraints of pre-existing content. For instance, let's think about an instructional designer working at a public institution with a legal obligation to provide accessible online learning for a learner. The legal obligation reinforces a perceived dichotomy between content that is 'legal or illegal' in the course, with the latter being considered unethical and undesired. The instructional designer has limited knowledge of code and finds WCAG hard to comprehend. The designer understands the legal obligation but fears repercussions if they do not create a "perfectly accessible" online course. Most instructional designers desire to reduce barriers for all learners, but the pressure and fear of failure can be daunting. In this scenario, the yes/no dichotomy is reinforced. This in turn may lead the designer to take on the approach of completing a 'checklist' to provide accessibility, failing to explore other solutions, technologies, or frameworks that may improve accessibility and usability on a broader scale.

Instructional designers recognize that technology and design practices are constantly evolving, and achieving perfect accessibility can be elusive. Technological advancements may outpace the development of universally applicable accessibility solutions, leading to a perpetual struggle to keep pace with evolving technology and standards. For example, recent advancements in video communication have demonstrated the benefits of multimedia in online learning (Morris et al., 2016). However, automated captioning technology is rarely accurate enough to provide an equivalent experience for those who may need it (Anderson, 2020). Likewise, audio description technology, or an audio track that describes the visual content for those with vision issues, is not yet widely available. Online course developers can edit captions or create audio descriptions, but that is often time-consuming and costly. There are several design strategies and best practices for creating video content that can reduce barriers such as working from a script that can become a transcript, editing automated captions as a starting point, and describing the visual content as a part of the presentation. However, when resources are limited, instructional designers may have to decide whether to devote time, money, and personnel toward editing captions or other priorities.

Ethical decision-making in delivering accessible online learning involves a nuanced approach to resource allocation. Instructional designers often grapple with the challenge of prioritizing accessibility initiatives within budgetary, time, and other resource constraints. Balancing the need for timely course delivery with the nuanced nature of accessibility enhancements presents a significant challenge. This dilemma raises questions about whether institutions

can reasonably be expected to meet ever-evolving accessibility standards within the constraints of academic timelines.

The ethical responsibility of instructional designers, therefore, involves navigating this delicate balance between legal compliance and the pragmatic challenges associated with achieving “perfect” accessibility. While recognizing the imperative to prioritize the needs of students with disabilities, designers may find themselves advocating to implement best practices for design within the constraints of available resources.

Accessible Frameworks

Design is all about options, possibilities, feedback, and iteration - not perfection (Moore, 2023). The design of online courses and materials is intended to be a purposeful activity that optimizes benefits and minimizes barriers. Accessible design should be an extension of this thinking. However, instructional designers frequently fall into the accessible or inaccessible dichotomy spiral. This leads to feelings of failure or unethical/imperfect accessibility in a course. Others grow increasingly adverse to striving for this perceived perfection as an unattainable goal. In fact, instructional designers may forgo the challenging conversations advocating for accessibility with administrators and faculty in favor of design considerations (Lomellini et al., in press). If there is no such thing as a perfectly accessible course or a perfectly designed course, how can we utilize the resources and knowledge we do have to design the most accessible courses possible?

IDs have other resources and tools that can be used as a guideline to inspire critical thinking and iterative design. For example, Universal Design for Learning (UDL), which has been aligned with WCAG (Gronseth, 2018), is a less technical set of guidelines intended to optimize learning for all by reducing barriers and empowering independent learners (CAST, 2024). The framework is centered on three core principles: Engagement (The “Why” of Learning), Representation (The “What” of Learning), and Action and Expression (The “How” of Learning). Embedded within each of these principles are suggested guidelines for implementation and application. Rejecting the idea of a typical learner, the concept of learner variability as found in UDL underscores the uniqueness of individuals in the learning process, emphasizing that there is no singular path to mastery (Meyer et al., 2014). No singular path to mastery also means there is no perfect design that would work for all students. However, designing multiple options for engagement, representation, and action and expression empowers students to both explore and tailor learning independently to their needs in any given situation, including temporary and permanent disabilities.

UDL is often positioned on the other extreme compared to the technical guidelines of WCAG. UDL can seem too loose and without clear, reproducible steps to guarantee inclusive learning environments. The perceived lack of clarity on how to implement UDL can also cause tension for those trying to achieve perfect accessibility and comply with legal obligations. There is an opportunity to shift this perception and debunk the myth that UDL is either too nebulous, not applicable, or too time-consuming. In this instance, concise and accessible language must be used to not only define UDL as a learning framework but to

demonstrate how its guidelines and principles can be tangibly applied in relevant and manageable ways. IDs can start by positioning UDL as a flexible and proactive framework that encourages learner preference, empowerment, and an equitable learning experience for all. UDL materializes in the variety of assessments offered to learners (thinking beyond the traditional research paper and multiple choice exam), the diversity of learning materials made available (i.e., eBooks, podcasts, Word documents, videos with captions), and the ability to pivot and adjust expectations or goals for learners.

The UDL guidelines can serve as suggestive solutions that guide the design and development of more inclusive learning experiences. Instructional designers do not need to check each box to improve the accessibility and inclusivity of an online course design. Moving away from the all-or-nothing approach can help make accessible course design more approachable for instructional designers and faculty alike. Instead of trying to check off each UDL principle and apply all of them to an entire course, an instructional designer can help a faculty member narrow their focus to one area of the course where students often struggle (Tobin & Behling, 2018). Identifying a real need for intervention and then trying various solutions guided by UDL and other course design and accessibility best practices can help make incremental improvements in the course. This approach favors progress and improvements in accessibility over the idea of attempting to achieve “perfection” by implementing all items in the UDL framework at once.

It is crucial to underscore that the goal of UDL is not to multiply resources or require each guideline to be explicitly checked off but to create a learning environment that proactively addresses diverse learner needs. By adopting UDL principles, educators can design instructional materials that are inherently flexible, reducing the necessity for duplicative efforts and improving inclusivity without compromising efficiency. Research suggests that training on UDL-related topics translates to improved implementation (Linder et al., 2015; West et al., 2016; Westine et al., 2019). With this in mind, we are reminded that focusing on progress makes accessible course design possible and a worthwhile goal to pursue.

While UDL can be a more digestible framework to draw ideas and solutions that support learners while reducing accessibility barriers (CAST, 2024), UDL does not answer all questions about accessibility and uncertainty around the legitimacy or compliance of the instructional designer’s work in the course. UDL is not the sole framework or learning theory for these purposes, nor is it the panacea for addressing inequities in learning. However, UDL has been linked to other frameworks such as the Community of Inquiry framework (Rogers & Gronseth, 2021), active learning (Rogers & Gronseth, 2021), Inclusive ADDIE (Gamrat, 2022), and quality assurance frameworks (Baldwin & Ching, 2021; Evmenova, 2021; Lowenthal et al., 2021).

Culturally responsive teaching (CRT) is another complementary framework that recognizes the importance of adopting a flexible teaching approach by emphasizing the cultural experiences of students as valuable strengths in their educational progress. In this context, CRT, as an instructional approach, encourages the significance of positionality and cultural diversity as assets that enrich the broader learning environment while fostering principles of equity, inclusion, and belonging. Instructional designers and professional development opportunities can assist instructors in enhancing and refining their abilities as culturally

responsive professionals empowering them to create learning environments that are pertinent and impactful for today's learning (Muñiz, 2019).

The key to ethically leveraging pedagogical frameworks is to remember that they are guidelines and not intended to be perceived as checklists with definitive answers. Design itself involves creativity to solve problems and iteration to improve designs over time.

Moving Beyond Quality Assurance Checklists

When building toward consistent and quality online courses, many institutions turn to a variety of quality assurance frameworks (Conklin et al., 2020; Zimmerman et al., 2020). Some examples of these frameworks include the Open SUNY Course Quality Review Scorecard (OSCQR), Quality Matters (QM), and National Standards for Quality Online Courses (NSQOC). Research suggests that institutions leverage these frameworks in a spectrum of ways ranging from strict adherence to peer review programs to internal adaptations mapped to institutional needs and resources (Lenert & Janes, 2017). Quality assurance frameworks can play a crucial role in establishing benchmarks for excellence in online course design. They can provide a structured approach to evaluating and improving various aspects of instructional design, thereby promoting consistency and high standards across educational offerings (Baldwin & Ching, 2021).

The ethical tension for instructional designers arises when these frameworks place disproportionate emphasis on particular components of design, potentially diverting attention away from equally vital aspects, such as accessible design. From the perspective of an instructional designer, the dilemma raises ethical concerns related to the potential neglect of accessibility in pursuit of a predetermined framework score. For example, in the pursuit of achieving a specified score within a quality assurance framework, instructional designers may feel compelled to prioritize elements that contribute directly to gaining enough points to "pass" the evaluation. One example might be measurable learning objectives. This particular item in development may be perceived as a "quick win" that is readily quantifiable, achievable, and demonstratable within the framework's parameters. Therefore emphasis on developing measurable objectives may inadvertently leave less time and resources for designers to allocate to the nuances of accessible design (Lomellini et al., in press).

Previous research cautioned against relying too heavily on standards and highlighted the risk of oversimplifying the essential elements of designing accessible and inclusive online courses (Baldwin & Ching, 2021; Lowenthal et al., 2021). The reduction of inclusive course design to a brief checklist in quality assurance frameworks may also foster a problematic compliance perspective similar to the dichotomy of accessible versus inaccessible or legal versus illegal (Lowenthal et al., 2021). It also reinforces the perception of accessibility as a checklist rather than a comprehensive approach focused on learners' needs and design solutions. Instead, accessibility should be considered an integral dimension of online course

design, ensuring that educational content is inclusive of diverse learner needs. Neglecting accessibility in favor of achieving a desired score on a quality assurance framework undermines the ethical responsibility of instructional designers to create an equitable learning environment for all students, including those with disabilities. This tension highlights the potential for a trade-off between adherence to a predefined framework and the comprehensive integration of accessibility principles.

To address this ethical dilemma, instructional designers can advocate for a balanced approach that prioritizes both quality and accessible design components. Institutions should recognize the interconnectedness of quality considerations and accessibility to avoid creating a hierarchical structure within quality assurance frameworks that may inadvertently steer resources away from critical components. Moreover, fostering a culture of awareness and continuous improvement can help mitigate the risk of neglecting accessibility in the pursuit of framework scores. Instructional designers can certainly use quality assurance frameworks and other accessibility checklists as a guide or a starting point. Accessible design supports and empowers learners to think, engage, and demonstrate learning. Purposefully keeping disabled students in mind and critically analyzing designs can be one tool in an instructional designer’s toolbox.

In conclusion, the ethical dilemma faced by instructional designers when required to adhere to quality assurance frameworks lies in the potential prioritization of certain components at the expense of critical elements like accessible design. Balancing these priorities requires a nuanced approach that acknowledges the interconnected nature of quality online course design, advocating for the comprehensive integration of both quality and accessibility principles to fulfill the ethical obligation of creating inclusive learning environments.

Reflective Practice

Instructional designers recognize that adherence to WCAG and laws is not only a legal obligation but also a moral responsibility. Upholding these standards is seen as an ethical commitment to promoting social justice and eliminating barriers to education for individuals with disabilities. From an instructional designer's perspective, the ethical dilemma is rooted in the tension between legal compliance (perceived and real) and the inherent imperfections in making online courses accessible. Ethical considerations in instructional design play a pivotal role in shaping the learning experiences of individuals, and designers bear the responsibility of ensuring educational content is not only effective but accessible and inclusive. Striking a balance between technology integration and learner success is essential, as designers navigate the ever-evolving landscape of educational technology and accessibility.

One way to strike such a balance is to be intentional in how we think about the problem of ethical and accessible online course design. Problem framing in ethical design refers to the deliberate and systematic process of defining the ethical challenges and considerations inherent in a given design context. It involves shaping the boundaries and parameters of a design problem in a manner that brings attention to the ethical dimensions, potential

implications, and stakeholder perspectives. Central to problem framing in ethical design is the recognition that ethical considerations are integral components of the design context and should not be treated as mere add-ons or afterthoughts. By explicitly framing ethical issues from the outset, designers can navigate the complexities of ethical decision-making, balancing competing values and interests.

We've discussed the ethical decisions and problem framing for accessible online learning. Let's explore some practical approaches you can consider in your designs by way of an activity.

Activity

In a presentation, Ingraham and Boyd (2020) discussed how they wanted to address both learning and supporting racial justice in design. They developed specific questions such as whether the materials perpetuated racial stereotypes, and reflected on these types of questions throughout the design and development process. By pausing to intentionally reflect on race-related problems, they were better able to iterate and make changes to the course.

If we apply the same idea of problem framing to accessible online course design, we can intentionally reflect on our current design practices and find a path forward. For this activity, we challenge you to formulate explicit questions about accessible course design that you could ask yourself as you work on your next instructional design project. We want to encourage a focus on both the learning design as well as accessibility. The overarching question would be: "How can we incorporate accessible design best practices?" You can develop more specific questions to help guide your process.

Another approach is identifying a problem in the course, such as students struggling with a certain concept or performing less than ideal on an assessment. Then, draw on accessible and inclusive frameworks such as UDL or inclusive design to ask yourself reflective questions grounded in these learning frameworks. This type of activity or reflective questioning can help you keep accessibility in mind when designing online courses.

Summary

In conclusion, the complexities surrounding legal mandates, the challenges of imperfection, and the pressures of adhering to quality assurance frameworks present significant challenges for instructional designers striving to create inclusive online learning

environments. Legal requirements like the ADA and Sections 504 and 508 of the Rehabilitation Act serve as critical drivers for accessibility initiatives, yet they can also reduce accessibility efforts to a binary compliance issue. This oversimplification can hinder incremental progress and stifle creativity in solving accessibility problems. Furthermore, the technical nature of guidelines such as WCAG, coupled with limited training and resources for instructional designers, compounds the difficulty of achieving (and moving beyond) compliance without sacrificing instructional quality. Addressing these issues through more research can uncover how to better motivate and equip instructional designers to embrace accessibility as a core design principle rather than a mere legal obligation.

Additionally, exploring the benefits of problem framing and other innovative approaches could transform the way instructional designers tackle accessibility challenges. By shifting focus from an all-or-nothing compliance mentality to a more nuanced, reflective, and iterative process, designers can make meaningful, incremental improvements in course accessibility. Incorporating frameworks like Universal Design for Learning (UDL) and culturally responsive teaching can further enrich this process, offering flexible, adaptable strategies that meet diverse learner needs. This research can guide the development of supportive training and resources, enabling instructional designers to effectively balance legal mandates with creative, student-centered design. Ultimately, fostering a culture that values continuous improvement and inclusivity will empower instructional designers to create more accessible and equitable online learning environments.

Implications for Future Research and Practice

Understanding of how the current accessible versus inaccessible and compliant versus incompliant thinking impacts instructional designers' motivation and ability to create accessible online learning environments is limited. More research is essential to uncover how these ethical dichotomies influence designers' decision-making processes and the quality of the learning materials they produce. For instance, the legal ramifications of failing to design accessible content might pressure instructional designers to prioritize accessibility, but without adequate support and resources, this pressure could lead to frustration and decreased motivation. Conversely, understanding how accessibility, as an intrinsic value, influences motivation could help develop better support systems and training programs for instructional designers, ensuring that accessibility is seen not only as a legal requirement but as a fundamental aspect of good instructional design.

Further research could also explore the benefits of incorporating problem-framing activities into the instructional design process, particularly when focusing on accessibility. Problem framing involves defining and understanding the context and requirements of a problem before devising solutions. By employing this technique, instructional designers can develop a more comprehensive understanding of the accessibility challenges faced by diverse learners. This approach could lead to more innovative and effective design strategies, ultimately enhancing the accessibility of online learning environments. Studies could

investigate how problem framing influences the designers' approach to accessibility, their creativity in finding solutions, and the overall quality and inclusivity of the learning experiences they create. Understanding these dynamics would provide valuable insights into how to better support instructional designers in creating accessible online education.

This line of research could significantly impact ID practice by informing the development of better policies, training programs, and resources. By understanding how a shift in thinking towards progress as opposed to compliance influences motivation and ability, institutions could create more supportive environments that encourage the prioritization of accessibility. For instance, if research reveals that legal pressures alone are insufficient and may even lead to frustration, organizations might focus on fostering intrinsic motivation through professional development opportunities that highlight the benefits and importance of accessibility. This shift could lead to more instructional designers seeing accessibility as a fundamental part of their design process rather than a burdensome requirement, ultimately resulting in more inclusive and effective online learning experiences.

Moreover, incorporating problem framing into instructional design practice could be another significant outcome of this research. If studies show that problem framing enhances designers' ability to create accessible content, instructional design programs could integrate this technique into their curricula and ongoing professional development. This integration could help designers approach accessibility challenges more strategically, leading to innovative solutions that address the diverse needs of learners. By emphasizing problem framing, instructional designers would be better equipped to understand and address accessibility from the outset of the design process, resulting in more thoughtful and comprehensive online learning environments. This approach could also foster a culture of continuous improvement and creativity in accessibility practices, ultimately benefiting both designers and learners.

References

Anderson, G. (2020, April 6). Accessibility suffers during pandemic. Inside Higher Ed. https://www.insidehighered.com/news/2020/04/06/remote-learning-shift-leaves-students-disabilities-behind

Baldwin, S. J., & Ching, Y. H. (2021). Accessibility in online courses: A review of national and statewide evaluation instruments. TechTrends, 65, 731–742. http://dx.doi.org/10.1007/s11528-021-00624-6

Black, R. D., Weinberg, L. A., & Brodwin, M. G. (2015). Universal Design for Learning and instruction: Perspectives of students with disabilities in higher education. Exceptionality Education International, 25(2), 1–26. https://doi.org/10.5206/eei.v25i2.7723

Boysen, G. A. (2021). Lessons (not) learned: The troubling similarities between learning styles and Universal Design for Learning. Scholarship of Teaching and Learning in

Psychology. Advance online publication. http://dx.doi.org/10.1037/stl0000280

Burgstahler, S. (2022). Leveling the playing field for students with disabilities in online opportunities. In M. Bonous-Hammarth (Eds.), Bridging marginality through inclusive higher education. neighborhoods, communities, and urban marginality (pp. 235–250). Palgrave Macmillan. https://doi.org/10.1007/978-981-16-8000-7_11

CAST. (2024). About Universal Design for Learning. https://www.cast.org/impact/universal-design-for-learning-udl

De Los Santos, S., Kupczynski, L., & Mundy, M. -A. (2019). Determining academic success in students with disabilities in higher education. International Journal of Higher Education, 8(2), 16–38. https://doi.org/10.5430/ijhe.v8n2p16

Friedensen, R., Lauterback, A., Kimball, E., & Mwangi, C. G. (2021). Students with high-incidence disabilities in STEM: Barriers encountered in postsecondary learning environments. Journal of Postsecondary Education and Disability, 34(1), 77–90.

Friedman, B., & Hendry, D. G. (2019). Value sensitive design: Shaping technology with moral imagination. MIT Press. https://doi.org/10.7551/mitpress/7585.001.0001

Gronseth, S. (2018). Inclusive design for online and blended courses: Connecting web content accessibility guidelines and Universal Design for Learning. Educational Renaissance, 7, 1-9. https://edtechbooks.org/-fML

Hall, T., Vue G., Strangman, N., & Meyer, A. (2003). Differentiated instruction and implications for UDL implementation. Wakefield, MA: National Center on Accessing the General Curriculum. http://www.cast.org/products-services/resources/2003/ncac-differentiated-instruction-ud.

Katsiyannis, A., Zhang, D., Landmark, L., & Reber, A. (2009). Postsecondary education for individuals with disabilities: Legal and practice considerations. Journal of Disability Policy Studies, 20(1), 35-45. https://www.researchgate.net/profile/Leena-Landmark/publication/240731498_Postsecondary_Education_for_Individuals_With_DisabilitiesLegal_and_Practice_Considerations/links/5596b9b708ae793d137ca5ff/Postsecondary-Education-for-Individuals-With-DisabilitiesLegal-and-Practice-Considerations.pdf

Kumar, S., & Ritzhaupt, A. (2017). What do instructional designers in higher education really do? International Journal on E-Learning, 16(4), 371–393. https://doi.org/10.4018/978-1-931777-04-9.ch020

IBSTPI (International Board of Standards for Training, Performance and Instruction) (2012). The 2012 Instructional Designer Competencies. IBSTPI. http://ibstpi.org.

Izzo, M. V., Murray, A., & Novak, J. (2008). The faculty perspective on Universal Design for Learning. Journal of Postsecondary Education and Disability, 21(2), 60–72. https://www.ahead.org/professional-resources/publications/jped/archived-jped/jped-volume-21

Lenert, K. A., & Janes, D. P. (2017). The incorporation of quality attributes into online course design in higher education. International Journal of E-Learning & Distance Education, 32(1). http://www.ijede.ca/index.php/jde/article/view/987

Linder, K. E., Fontaine-Rainen, D. L., & Behling, K. (2015). Whose job is it? Key challenges and future directions for online accessibility in US institutions of higher education. Open Learning: The Journal of Open, Distance and e-Learning, 30(1), 21–34. https://doi.org/10.1080/02680513.2015.1007859

Lomellini, A., & Lowenthal, P. R. (2022). Inclusive online courses: Universal Design for Learning strategies for faculty buy-in. In J. E. Stefaniak & R. M. Reese (Eds.), The instructional designer's training guide: Authentic practices and constructive mentoring for ID and ed tech professionals (pp. 101–111). Routledge. https://doi.org/10.4324/9781003109938

Lomellini, A., Lowenthal, P. R., Snelson, C., & Trespalacios, J. (in press). Instructional designers' perceptions of accessible and inclusive online course design.

Lowenthal, P. R., & Lomellini, A. (2022). Creating accessible online learning: A preliminary investigation of educational technologists' and faculty's knowledge and skills. Tech Trends. https://doi.org/10.1007/s11528-022-00790-1

Lowenthal, P. R., Lomellini, A., Smith, C., & Greer, K. (2021). Accessible online learning: A critical analysis of online quality assurance frameworks. Quarterly Review of Distance Education, 22(2), 15–29. https://www.infoagepub.com/products/Quarterly-Review-of-Distance-Education-22-2

Meyer, A., Rose, D. H., & Gordon, D. (2014). Universal design for learning: Theory and practice. CAST. https://www.cast.org/products-services/resources/2014/universal-design-learning-theory-practice-udl-meyer

Moore, S. L. (2023). Ethics and educational technology. Reflection, interrogation, design with Stephanie Moore [Video]. YouTube. https://youtu.be/y3WqtA8CVY0?si=tO4TTuEwxy63Eq2p

Moore, S. L. (2021). The design models we have are not the design models we need. The Journal of Applied Instructional Design, 10(4). https://doi.org/10.59668/329.5266

Morris, K. K., Frechette, C., Dukes, L. III, Stowell, N., Topping, N. E., & Brodosi, D. (2016). Closed captioning matters: Examining the value of closed captions for "all" students. Journal of Postsecondary Education and Disability, 29(3), 231–238. https://www.ahead.org/professional-resources/publications/jped/archived-jped/jped-volume-29

Muñiz, J. (2019). Culturally responsive teaching: A 50 state survey of teaching standards. New America. https://files.eric.ed.gov/fulltext/ED594599.pdf

National Center for Education Statistics, U.S. Department of Education. (2016). Table 311.10 : Number and percentage of distribution of students enrolled in postsecondary institutions by level, disability status, and selected student characteristics: 2007-08 and 2011-12. National Center for Education Statistics. https://nces.ed.gov/programs/digest/d16/tables/dt16_311.10.asp

National Center for Education Statistics, U.S. Department of Education. (2019). Table 311.10 : Number and percentage of distribution of students enrolled in postsecondary institutions by level, disability status, and selected student characteristics: 2015-16. National Center for Education Statistics. https://nces.ed.gov/programs/digest/d19/tables/dt19_311.10.asp

Oyarzun, B., Bottoms, B. L., & Westine, C. (2021). Adopting and applying the Universal Design for Learning principles in online courses. The Journal of Applied Instructional Design, 10(1). https://doi.org/10.51869/jaid2021105

Ritzhaupt, A. D., Kumar, S., & Martin, F. (2021). The competencies for instructional designers in higher education. EdTech Books.

Rogers, S. & Gronseth, S. L. (2021). Applying UDL to online active and interactive learning. The Journal of Applied Instructional Design, 10(1). https://doi.org/10.51869/jaid2021101

Singleton, K., Evmenova, A., Jerome, M. K., & Clark, K. (2019). Integrating UDL strategies into the online course development process. Online Learning, 23(1), 206–235. https://doi.org/10.24059/olj.v23i1.1407

Smith, S. A., Woodhead, E., & Chin-Newman, C. (2021). Disclosing accommodation needs: exploring experiences of higher education students with disabilities. International Journal of Inclusive Education, 25(12), 1358–1374.

Tobin, T. J. & Behling, K.T. (2018). Reach everyone, teach everyone: Universal Design for Learning in higher education. West Virginia University Press. https://wvupressonline.com/node/757

United States Department of Justice. (2023). Dear colleague letter on online accessibility at postsecondary institutions. https://www.justice.gov/crt/case/dear-colleague-letter-online-accessibility-postsecondary-institutions

West, E. A., Novak, D., & Mueller, C. (2016). Inclusive instructional practices used and their perceived importance by instructors. Journal of Postsecondary Education and Disability, 29(4), 363–374. https://www.ahead.org/professional-resources/publications/jped/archived-jped/jped-volume-29

Westine, C. D., Oyarzun, B., Ahlgrim-Delzell, L., Casto, A., Okraski, C., Park, G., Person, J., & Steele, L. (2019). Familiarity, current use, and interest in Universal Design for Learning among online university instructors. The International Review of Research in Open and Distributed Learning, 20(5). https://doi.org/10.19173/irrodl.v20i5.4258

Xie, J., & Rice, M. F. (2021). Professional and social investment in universal design for learning in higher education: Insights from a faculty development programme. Journal of Further and Higher Education, 45(7), 886–900. https://doi.org/10.1080/0309877X.2020.1827372

Xie, J., A. G., & Rice, M. F. (2021). Instructional designers' roles in emergency remote teaching during COVID-19. Distance Education, 42(1), 70–87. https://doi.org/10.1080/01587919.2020.1869526

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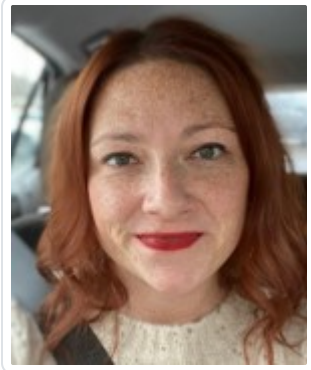

Katie Grennell

Black Children at Play: The Cultural Practices of the ILLEST Lab

Edouard, K.

Access Creativity Equity Maker Movement Makerspace Play

Imagine a makerspace deliberately designed to maximize creativity and inspire racially minoritized participants, especially Black children, where they can freely explore all levels of creativity. At the heart of the chapter, we are looking to address the open nature of makerspaces and allowing Black students the flexibility to iterate, prototype, and fail without While equity and access in makerspace environments have begun to be areas of focus within the informal learning research community, more research is needed that investigates the types of engagement. Particularly for Black students, discussions of equitable access are followed by the interrogation of tools, curriculums, and design of the learning environment. However, there is very little around the creative exploration

and collaborative relationships fostered by participation in the makerspace. In this chapter, I am looking to address the open nature of makerspaces and allowing Black students the flexibility to iterate, prototype, and fail without consequences.

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In this study, I describe cultural practices at the ILLEST Lab that support creative play and exploration for the Black student participants. The ILLEST, which stands for Informal Learning Linking Engineering Science & Technology, is a university-housed makerspace open to both university and school-aged residents of West Philadelphia, which is a Promise Neighborhood. The ILLEST was designed as a call to action where students in the West Philadelphia community could collaborate and engage in STEAM practices through a multigenerational environment, free of expectations and assessments, allowing them to be stewards of their STEAM engagement.

The ILLEST houses 3D printers, turntables, power tools, 300 pairs of sneakers, a flight simulator, and a 10-foot poster of Kermit the Frog wearing a Supreme box-logo T-shirt. The creation of this space is part of a purposeful accumulation of culturally responsive and curated resources set to become the foundation for a cornucopia of maker projects. The activities in the ILLEST were designed to provide students with flexibility and creativity to produce projects such as designing and engaging a 3D printer to create prosthetic limbs, testing the latest sneaker technology, or designing a chemistry experiment based on the optimal combination of coconut and essential oils to provide the maximum level of hair-moisturizing protection against humidity on a warm spring day. The centralized goal of the ILLEST is to support culturally responsive creative thinking (CRCT) that embraces Black students' social contexts as a foundation for the transfer of STEAM competencies and their project-based activities.

Transgenerational Counter Space

The ILLEST was designed to function as a counter space to the accepted traditions of makerspaces and making cultures. The foundation of the ILLEST was based on a desire to dispel the many examples of cultural bias documented by women and racially minoritized participants. A power dynamic exists between the creators and participants of makerspaces (Vossoughi et al., 2016), where curriculum, projects, and tools are used to set cultural norms (Halverson & Sheridan, 2014). The benevolence of STEM opportunities can subjugate participants, which in turn perpetuates and continues an uneven power dynamic (Sengupta-Irving & Vossoughi, 2019). This power dynamic can be referenced as an unspoken or invisible power over participants and the environment. The design of a STEM environment reveals a great deal about its creators' values and potential aspirations (Martin, 2014).

By not providing Black participants with an environment that embraces creative and design flexibility, makerspace creators are trafficking in the benign neglect of resources and power (Sengupta-Irving & Vossoughi, 2019), using this group's conditions to reinforce a single direction of power that ultimately fosters a deep lack of creative empathy. Makerspaces are not frictionless environments, but in this research, I integrate the tensions of the cultural practices of established makerspaces and the latitude of racially minoritized participants to be creative and simply play.

The ILLEST Lab is a transgenerational learning makerspace integral to building upon youth-centered cultural practices. It is defined as transgenerational because of the fluid generational leadership found within the lab. The intentional design of transgenerational participants is so that knowledge and creativity are accessible to all participants within the space. Experts with advanced knowledge and skills and newcomers with limited knowledge and skills all become contributors to the construct of a learning community with members from various levels of STEAM experience, knowledge, and skills. At any point, middle school students can be mentored and led by a high school student, who then seeks the advice of undergraduate engineering students supervised by Ph.D. or postdoctoral students.

According to previous studies, the benefits of generational differences heighten retention and creativity for participants (Sánchez & Kaplan, 2014; Tillinghast et al., 2017; Bers, 2007). The differences in participants' generations can also expose variations in attitudes and life experiences. For a makerspace designed for a particular minoritized group, it also highlights nuances that ultimately dismiss the monolithic identity that has been attributed to Black students. The ILLEST welcomes these differences and builds on the transgenerational dynamics in teaching and learning, which builds a creative and interaction-rich learning environment, a key component of community building and learning (Sánchez & Kaplan, 2014).

Theoretical Framework

Play as a Form of Resistance

At the heart of play-based learning is the opportunity for young people to explore and experiment not just individually but in a collective learning environment (Yahya & Wood, 2016). Early childhood education research frames of play-based learning around experimentation and reflection (O et al., 2014) but falls short of the discussion around the cultural practices and norms for minoritized participants (Yahya & Wood, 2016). The belief that all children have an equal opportunity is problematic, especially when Black students are less likely to be allowed to do play-based learning compared to their white peers (Ford et al., 2008). Allowing Black students the flexibility to engage freely with new objects, concepts, and project-based activities provides a critical lens on play-based learning. Black students have voiced frustrations with not being given opportunities for unstructured interactions with STEM learning tools and objects. Research on cultural practices of white students in STEM environments yields a different reality, where students are allowed unstructured play to engage and master new tools and resources without restrictions (Shmukler & Naveh, 1985). My position is that allowing Black students the opportunity to engage in unstructured play is an act of resistance against the traditional practices of play-based learning. There is potential for identity alignment and harnessing creativity for Black students.

As active learning environments (Bean et al., 2015) in which students use an array of learning expertise to shape skills in real-world design applications, makerspaces have galvanized educators and research (Hira et al., 2014). Yet, a tension for makerspace design ethos is the neglectful application of foundation-inclusive and culturally relevant principles to help support a diverse population (Vossoughi, 2014). Cultural modeling sits at the nexus of design and cultural practices within makerspaces.

Dr. Carol Lee's cultural modeling supports the direct discussion of encouraging students' everyday knowledge in content-specific learning spaces (Lee, 2003). At its core, cultural modeling (CM) allows researchers and educators to create a routine inventory of students' practices during out-of-school activities and engagements (Lee, 2007). This curation provides beneficial insight into students' cultural and cognitive practices, specifically in their community settings (Lee, 2014). The key to CM is creating an opportunity for educators to map students' lived experiences and skills onto domain-specific content areas, topics, and procedures across the learning setting (Lee, 2008). Cultural modeling was designed using research on student learning, expert-novice studies, and human development. Dr. Lee used CM to inform the interdisciplinary field of learning sciences while making a persuasive case for the inclusion of culture and cultural practices in the understanding of human learning.

Informal out-of-school makerspaces are a popular resource, providing students an opportunity to learn and engage in both active learning and building community (Bowler, 2014). Yet, empirical research around makerspaces has found the collaborative and learning narratives to be rife with continued biases and equity concerns (Halverson & Sheridan, 2014), particularly for racially minoritized participants (Sengupta-Irving & Vossoughi, 2019). In a 2013 presentation at a FabLearn conference at Stanford University, Dr. Leah Buechley declared: "The Maker movement has grown large enough and influential enough that it's time to turn a critical eye to the culture of the community, what we want it to be and what it really is." Critiques of makerspaces and the movement are increasing in both the academic

and classroom communities, with the stated purpose of making sure that the community looks inward and fulfills the stated transformative promises (Sheffield et al., 2017).

The research critically examining makerspaces beyond the disruptive narrative and dismantling force has been led by critical pedagogists and social justice-minded academics who firmly believe in the potential of these informal spaces. Yet, makerspaces have never been portrayed as counter spaces to the hegemonic powers that govern STEM special interests (Vossoughi, 2014). Counter spaces present themselves as alternatives to the mainstream philosophies of learning, engagement, and production (Ong et al., 2018). Many makerspaces have a running ethos around competitive success and computer-integrated activities, which often reflect the normative behaviors of white male scientists or engineers (Edouard & Kim, 2017). The counter-narrative around makerspaces relies on assessing students' activities, where testing takes a back seat to the activities' learning and project-based creation. Each is the selling point in the test- and data-heavy education landscape that has presented itself over the last 40 years. Makerspaces counter data and testing norms by providing an evangelist-style unifying language around disruptions, innovation, and technological tools (Dougherty et al., 2016).

However, role power, time, and unstructured play in the makerspace are missing in the research narrative. For many who have found themselves on the outside of the makerspace, there is this question: Who specifically defines the ethos of creativity and engagement in a makerspace? Interdisciplinary critical pedagogists and learning scientists have zeroed in on the power dynamics surrounding the design and formation of makerspaces (Sengupta-Irving & Vossoughi, 2019).

Methods

Participants

Included in the study were five Black high school students from the West Philadelphia area, with one being female and four males. The participants were all juniors and attended five different high schools. Each high school had the distinction of being a magnet school with access to a makerspace, science, and vocational labs. Participants learned about the study by word-of-mouth recruiting conducted by one primary participant. This student, Alan, had attended previous sessions at the university for three years prior. Alan indicated that he knew of other students he could recommend that would benefit from participating in activities in the ILLEST Lab. After two weeks of emailing and contacting each of those students, the five students were assembled. The group initially met at the lab, where they met with faculty who explained the space and asked if they would like to attend weekly. Upon agreement with the weekly attendance aspect, students were given consent forms and asked to get permission from parents to be in the lab space for participation and research. Students attended open lab hours at the ILLEST Lab from October to April. Each arrived at the space, taking public transit from their high schools around the city.
The students attended an open lab session for two hours, from 3:30 p.m. to 5:30 p.m. At the lab, two Black female graduate students, one Black male engineering student, one Middle

Eastern engineering undergraduate student, and one Black assistant professor supported the participants during the open lab hours. These students also have engaged in multiple formal and informal STEM and makerspace experiences. They also created various makerspace projects and entered into competitions for scholarship opportunities. We selected these five students because they exhibited a high drive and technical proficiency in makerspaces.

Research Method

This empirical study primarily used observation and journaling of the participants within the ILLEST, a university-based makerspace. These observations focused on how students self-organized within the group, made decisions and selected potential projects. Upon arrival, students were asked to give interviewed reflections on their activities during the day at their respective school sites, with questions focused on activities in their local makerspaces. We looked at observations of group interactions, how they demonstrated content knowledge, and the selection of projects.

Our observation was centered around each Wednesday session, where the five participants and the five mentors interacted with each other. The first month was a collective meetup, where the conversations around ordering the pizza allowed each lab member to build a deeper connection with one other within the space. The first month let the mentors identify some of the making competencies the participants knew. They did this by asking probing questions about the tools and activities each of the five engaged in at their respective makerspaces. These non-structured questions were positioned to allow the students to openly share their experiences with a larger group to see if there were commonalities, allowing the researchers to pinpoint if there were through lines and reoccurring themes. As the relationships with the group began to develop over time, the decision was made over the following two months to pair each participant with a mentor. These pairings were decided by how the students began to ask direct questions to particular mentors and build affinities for their works. Ultimately, the goal was to pair participants with mentors who inspired them. We also collected data by providing students with a journal to use on and off-site. The goal was to have students document ideas, inspirations, and personal feelings. We initially kept a strict journal writing requirement upon arrival to the lab to document the day's goals and write for five minutes at the end of the day. The key was to combine the observations, interviews, and journaling to achieve a wider picture of their activities within the ILLEST Lab.

Part of our observation was to better grasp how the participants brought prior knowledge from their makerspaces and how it was being integrated with the interactions at the ILLEST Lab. One of the first things done was to map their language around the tools within the space. We observed if they correctly named the tools and if they could correctly reference the tools within the lab. We also paid close attention to how the participants were teaching each other about the correct usage of the tools and if there were alternative ways of using the tools within the lab. Through observation and journaling, we set out to find if the students could connect the scientific and mathematical foundations with the activities in the makerspace. For example, when building the circuits, we observed how the students used Ohm's Law correctly to engage in a project. Our observations also allowed us to monitor how students looked up new vocabulary and terms using internet searches to help them better

understand a particular science or engineering concept. We only used observation to get at the heart of the competencies because early on in our interactions with the students, they expressed that they felt uncomfortable answering questions they felt were trying to expose their lack of knowledge. Asking interview questions on concepts posed a challenge as the students made it clear that in their respective makerspaces, they were consistently being quizzed and felt singled out as opposed to their white counterparts.

Part of the open nature of the ILLEST Lab for this group of participants was giving them free rein to select, design, and construct a project for their six-month duration. This was a considered option, primarily based on the early interactions with the students, where they made it evident that they were not allowed to have a voice in the overall project selections at their respective makerspaces. The students expressed that not being able to select or have a voice in the selection of their maker projects made them feel unvalued at their respective makerspaces. Using observations and curating their produced artifacts, we began to map how long each mentor-mentee group would think about a project, design, and create an order list. We documented the conversations across the various months and took photos and videos of the paper prototyping of their initial project designs. Each pairing began the process of creating a parts list, which would be ordered through the ILLEST Lab and delivered for them to begin their projects. We also documented the emails and digital conversations between the pairings while the participants were off-site as they continued to prepare for the projects. Ultimately, due to the winter and spring holiday breaks, there were gaps in the ordering and completion of the projects. However, the main part of the data collection was surrounded by the creative process of the pairings, focused on the participants themselves and their agency toward their maker project.

Findings

As the year ended, some participants expressed joy in being in a space that provided them an open family-style environment to engage in science and engineering. For many participants, continuing to attend the after-school program became difficult due to other commitments. As we sorted through the data, we realized that two particular students stood out as having 100% attendance and provided a thoughtful insight into their feelings and what took place at the ILLEST Lab. The difficulty of getting all of their voices shared in our findings came down to the difficult decision of picking the two dominant voices to help provide insight into our findings. Each student provided a clear discussion about gender and racial barriers that they found in their respective makerspaces and how the ILLEST Lab provided a space to help explore and navigate these tensions.

Unstructured Play in the Role of Social Interaction

Darius, a participant, would come into the ILLEST expressing the need to rest and recover from a long day at school. Ultimately, he wanted an opportunity to relax, engage, and be open, which was one of the fundamental things missing at the makerspace in his

school. “Yo, they just always pressuring me, and I don’t know how I feel.” At his school’s makerspace, Darius explained that they discussed his need to be in some form of leadership, as few racialized minority students participated. He did not want or feel comfortable starting in a leadership role and wanted first to be a part of the community and learn. “I just never was given an opportunity to kind of just you know, find myself and really be able to understand my role.” This sentiment was a constant theme from Darius when discussing his struggles with being placed in a leadership role.

When asked if he felt he was being pushed or singled out, his answer was very direct: “I think they just want to give me some type of opportunity to say something. But that’s just not me.” In his interview, Darius talks about how his identity formation had not yet flourished or been given the opportunity to grow.

When asked how his experience at the ILLEST differed, Darius provided a contrasting set of realities, stating, “When I come here, I can just chill. Maybe get something to eat and then think a little bit with my friends.” A community was starting with the four other participants. Darius, who was familiar with the other four participants before coming to the ILLEST through other communities in and around Philadelphia, felt it was important that he started to build community with his peers.

Multiple times throughout the months, Darius was found discussing music, comic books, and the latest sneakers he wanted to buy. Seldom Darius was asked to get back on task or asked to produce a deliverable. During an interview, Darius highlighted this engagement: “It seems that in this space, you guys don’t sweat me as much. You allow me to kind of figure things out.” There is a particular discussion around the flexibility of the space to give him time and opportunity to feel confident at the ILLEST.

Darius was allowed to develop and create some ideas for a group project. One such project was designing and creating an electric bicycle. Particularly, Darius wanted to design a mode of transportation that had a sustainable energy approach. He explained that in his other classes, they talked about sustainable energy and access to sustainable resources to help better the planet. Darius immediately thought about his commute and how potentially all the buses he would ride emit toxic chemicals. If he could transport himself to and from school using an electric bicycle, he could add to the discussion of a sustainable and healthy planet.

These discussions continued to be generative as Darius discussed building a better community in Philadelphia. He saw the makerspace and all the tools within it as an opportunity to engage in these developments. Using the lens of bettering his community, Darius found himself at the center of not only the making community but also being able to use the tools, processes, and content knowledge he gained within the space to design and create products to help better his outside community.

On many occasions, while talking with his peers at ILLEST, Darius applauded his access to plentiful resources. “At our makerspace at our high school, we actually have to check out certain amounts of resources, but I sometimes think it might be unfair because some of the white kids they get to check out more than me. And I don’t think that’s cool.” Darius addressed the potential inequity between the access to resources at his high school and the ILLEST. He felt that while he was asked to be a leader at his school’s makerspace, he was

still not given the same flexibility as his white peers regarding access to resources. It is important to observe the language around identity and the potential identity to be developed in the makerspace when the participants are positioned or charged for engaging in the makerspace when it comes to time and access to resources.

Play that Allows for Creativity

“Really, sometimes I don’t feel that my opinion matters. And most of the time, people just keep speaking over me.” Jessica was the only female participant. She is one-half of a twin. Her twin sister was supposed to be a participant in the ILLEST but was given another opportunity. She recommended that her sister, who was also heavily interested in engineering practices, take her place at the ILLEST. Initially, Jessica was apprehensive and resistant to joining the group as she would be the only female within the space. She expressed concern that her voice would not be given an ample platform to share and engage in any activities.

Jessica was given time to meet and acclimate to the environment. Her observed behaviors began to show some of her previous struggles and feelings while at her school’s makerspace and other informal spaces before being at the ILLEST. In an interview, Jessica shared the following,

> *A lot of times, we are asked to rush through our activities, and I'm not given enough time to be able to just think about what it is I want to do. So what happens a lot of times is that my group members forced their opinions on to me in order to meet a deadline. I become uncomfortable and just agreed to get along.*

Jessica made it very apparent that this kind of atmosphere at her school was not conducive to her being creative and developing ideas within the makerspace.

As her time at ILLEST went on, she highlighted the differences in her peer groups and the overall energy within the space, stating, “What I noticed here with all these guys is that they don’t feel pressure and therefore they’re not giving me pressure. We just kind of sit here, play and laugh, and talk about music and food. I like that.” Jessica highlights how the environment and the atmosphere allow her to build with her peers and lower anxiety when designing and creating projects within the makerspace. She chose different activities to engage in to better familiarize herself with the tools and some of the technical competencies required to navigate throughout the ILLEST. She shares, “Honestly, what’s cool here is that we can play, and it just helps me think of random things.” Being able to navigate the ILLEST openly allowed Jessica to piece together possibilities and options to create afforded to her peers at her school’s makerspace. It would seem that Jessica, as an African-American young woman, found a peer group and an environment that allowed her to have a voice and develop an identity within the space where she could be the steward of her own making potential.

Discussion

In this study, we explored how Black students were provided the opportunity to engage in a learning-focused makerspace without the constraints of time and a mandate for deliverables. We selected high-achieving students and placed them in a low-stakes environment with access to an infinite amount of college resources to see how they would engage with space and each other. Our research found that the students were initially intimidated by the opportunity to navigate openly and explore the environment and tools. Over the three months, five students effectively self-organized and self-taught on the machines and tools in the makerspace. Students had minimal access to instructor scaffolding and were allowed to use cell phones, laptops, and tablets to search and lookup any technical expertise required to run a machine or design a project.

Observation within the Space

Observing the language and the physical movement using tools and resources allowed the researchers to see how an open, unstructured makerspace can be relevant to forming identity and sparking creativity. The students clarified that race and gender played roles in how they felt and saw their identity development in the makerspaces. Darius explained how using resources was inequitable compared with his white peers. Jessica raised gender concerns as the pressure to complete tasks and engage in activities pushed her voice further to the side, as the boys in her group were dominant in shaping projects to reach deadlines.

For our research, we looked to create and facilitate discussions around allowing Black students to engage in a culturally relevant makerspace environment freely. Our findings call on makerspaces to prioritize Black students' experiences to join in unstructured play. Unstructured play within makerspaces requires further investigation to understand different cognitive and cultural practices needed to maximize the experiences and creativity of Black participation in makerspaces.

Conclusion

At the heart of this chapter, we aimed to understand better what drives creativity and agency for Black student participants in a makerspace. What was ultimately uncovered was that the design of the environment was the most important aspect. Things like the type of background music the mentors available to them who had roots in the local community. This approach was a fundamental part of design where you have to make underrepresented students feel that their presence is not only welcome but at the center of the design and creative process that takes place within a makerspace.

One of the first recommendations was to ensure Black mentorship was visible and present to give the participants something to aspire to. The mentors were specifically from the academic and career pathways the students aspired to participate in. We were also intentional in having gender representation within the space so that the Black female participants could feel a sense of connection in a male-dominated space.

What we observed from conversations, journaling, and the project artifacts was that when we created an open, non-competitive environment, the students' anxiety levels decreased, and they felt like there was less likelihood of punitive consequences of iterations of their project. Two students made it clear that at their school, having a finite set of resources did not allow them to prototype as often as they would have liked, and it became a competition for who had the best idea voted on by the group to move on to the prototyping stage.

At the ILLEST Lab, students were encouraged to prototype and not take access to resources as a barrier. What was surprising was asking students to select their projects did not yield a completed design. The trouble from our observations was that the students were not used to having so much freedom and say in their projects. Multiple times, participants would explain that they were happy and welcomed the agency to select their projects. But at the same time, they could not produce a final product.

The researchers concluded that 1) time on task was limited due to the once-a-week nature of the lab, and 2) the students had high expectations of themselves and wanted to impress their mentors. One student expressed that she did not want to disappoint or let down their mentor, so the participant wanted to think of the perfect project to express gratitude. It seemed the anxiety built up from the students' prior interactions in other makerspaces still played a role in how they engaged at the ILLEST Lab. It was as if their unsuccessful participation in other settings still presented a barrier, even in a supportive environment. A recommendation would be for designers of makerspaces to consider participants' anxieties and past traumas when selecting and designing projects. Doing so should help make the students feel empowered. The hope is that this chapter provides nuance when having discussions around the participation of Black students in makerspaces and that at the forefront, creativity and agency are at the center of providing generative opportunities for participants who have been traditionally shut out of STEAM fields.

Reference

Bean, V., Farmer, N. M., & Kerr, B. A. (2015). An exploration of women's engagement in makerspaces. *Gifted and Talented International, 30*, 61–67. https://doi.org/10.1080/15332276.2015.1137456

Bowler, L. (2014). Creativity through "maker" experiences and design thinking in the education of librarians. *Knowledge Quest, 42*(5), 58–61.

Dougherty, D., O'Reilly, T., & Conrad, A. (2016). *Free to make: How the maker movement is changing our schools, our jobs, and our minds*. North Atlantic Books.

Edouard, K., & Kim, Y. (2017). *Making culture*. ExCITe Center. https://drexel.edu/excite/engagement/learning-innovation/making-culture-report/

Halverson, E. R., & Sheridan, K. M. (2014). The maker movement in education. *Harvard Educational Review, 84*(4), 495–504. https://doi.org/10.17763/haer.84.4.34j1g68140382063

Hira, A., Joslyn, C. H., & Hynes, M. M. (2014). Classroom makerspaces: Identifying the opportunities and challenges. Proceedings of the *2014 IEEE Frontiers in Education Conference (FIE)*, 1–5. https://doi.org/10.1109/FIE.2014.7044263

Lee, C. D. (2003). Toward a framework for culturally responsive design in multimedia computer environments: Cultural modeling as a case. *Mind, Culture, and Activity, 10*(1), 42–61. https://doi.org/10.1207/S15327884MCA1001_05

Lee, C. D. (2007). *Culture, literacy, & learning: Taking bloom in the midst of the whirlwind*. Teachers College Press.

Lee, C. D. (2008). The centrality of culture to the scientific study of learning and development: How an ecological framework in education research facilitates civic responsibility. 2008 Wallace Foundation Distinguished Lecture. *Educational Researcher, 37*(5), 267–279. https://doi.org/10.3102/0013189X08322683

Lee, C. D. (2014). The multi-dimensional demands of reading in the disciplines. *Journal of Adolescent & Adult Literacy, 58*(1), 9–15. https://doi.org/10.1002/jaal.316

Lee, C. D. (2017). Integrating research on how people learn and learning across settings as a window of opportunity to address inequality in educational processes and outcomes. *Review of Research in Education, 41*(1), 88–111. https://doi.org/10.3102/0091732X166890

Martin, P. (2014). MakeHERspaces: STEM, girls, and the maker movement. *CRB Short Subjects [S-14-022]*. California Research Bureau. https://eric.ed.gov/?id=ED564891

O, I. A. F., Faqih, A., & Bustan, W. K. (2014). Children's active learning through unstructured play in Malaysia. *Childhood Education, 90*(4), 259–264. https://doi.org/10.1080/00094056.2014.933695

Ong, M., Smith, J. M., & Ko, L. T. (2018). Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success. *Journal of Research in Science Teaching, 55*(2), 206–245. https://doi.org/10.1002/tea.21417

Sengupta-Irving, T., & Vossoughi, S. (2019). Not in their name: Re-interpreting discourses of STEM learning through the subjective experiences of minoritized girls. *Race Ethnicity and Education, 22*(4), 479–501. https://doi.org/10.1080/13613324.2019.1592835

Sheffield, R., Koul, R., Blackley, S., & Maynard, N. (2017). Makerspace in STEM for Girls: A physical space to develop twenty-first-century skills. *Educational Media International, 54*(2), 148–164. https://doi.org/10.1080/09523987.2017.1362812

Shmukler, D., & Naveh, I. (1985). Structured vs. unstructured play training with economically disadvantaged preschoolers. *Imagination, Cognition and Personality, 4*(3), 293–304. https://doi.org/10.2190/WQ65-UNAM-VDV9-PLMR

Vossoughi, S., & Bevan, B. (2015). Making and tinkering: A review of the literature. *The National Science Foundation's (NSF) Advancing Informal STEM Learning (AISL)*

program. https://www.informalscience.org/making-and-tinkering-review-literature

Vossoughi, S., Hooper, P. K., & Escudé, M. (2016). Making through the lens of culture and power: Toward transformative visions for educational equity. *Harvard Educational Review, 86*(2), 206–232. https://doi.org/10.17763/0017-8055.86.2.206

Yahya, R., & Wood, E. A. (2016). Play as third space between home and school: Bridging cultural discourses: *Journal of Early Childhood Research, 15*(3), 227–235. https://doi.org/10.1177/1476718X15616833

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Improving Engagement by Diverse Learners in Today's Post 'Pandemic Pedagogy' Era

Five Key Theoretical Perspectives

Subramony, D. P.

With a view towards encouraging effective, theory-based praxis amongst contemporary teachers, this Chapter employs a set of five distinct—and, at the same time, neatly complementary—theoretical perspectives to discuss how we might be able to better engage socioeconomically and culturally diverse learners within the blended teaching and learning contexts that have become the new normal in the current post 'pandemic pedagogy' era that dawned following the lifting of the global lockdowns and 'emergency remote teaching' protocols that were instituted to curb the spread of multiple emergent variants of the SARS-CoV-2 virus. Three of the aforementioned perspectives—Context Analysis, Cognitive Load, and Social Constructivism—are widely familiar and have been influencing our praxis for decades, while the

remaining two—Proximal/Distal Factors and Communication Configurations—represent more recent, novel constructs.

Introduction

While learners can access plentiful online information regarding any topic on their own, skilled and knowledgeable instructors can infuse accountability, structure, and guidance to the online learning process. With a view towards encouraging effective, theory-based praxis amongst contemporary teachers, this Chapter employs a set of five distinct—and, at the same time, neatly, elegantly, and appealingly complementary—theoretical perspectives to discuss how we might be able to better engage socioeconomically and culturally diverse learners within the blended teaching and learning contexts that have become the new normal in today's post 'pandemic pedagogy' era. By this I am referring to the current age that has dawned following the progressive lifting of the various global lockdowns and 'emergency remote teaching' protocols that were instituted to curb the spread of multiple emergent variants of the SARS-CoV-2 virus during the initial years of the Covid-19 pandemic.

Three of the aforementioned perspectives—Context Analysis (Tessmer & Richey, 1997), Cognitive Load (Sweller, 1988), and Social Constructivism (Vygotsky, 1978)—are widely familiar and have been influencing our praxis for decades, while the remaining two—Proximal/Distal Factors and Communication Configurations (Molenda & Subramony, 2021)—represent more recent, novel constructs.

Connection with Applied Ethics

Before commencing a detailed discussion of the perspectives introduced above, it is important, given that the stated focus of this volume is applied ethics, to explicitly establish and describe the connection between what is being discussed within this chapter—i.e., improving engagement by socioeconomically and culturally diverse learners within the technology-mediated teaching and learning contexts characterizing the post Covid-19 era—and the application of ethical principles to our praxis as teachers.

To begin with, the aforementioned connection can be discerned simply by contemplating—as discussed in Subramony (2017)—the Association for Educational Communications and Technology (AECT)'s official 2007 definition of the field of educational technology: "...the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (AECT Definition and Terminology Committee, 2007, p. 1, emphasis added). Discussing the intended meaning of the words "ethical" and "appropriate" within the context of said definition, the Committee—comprised of leading scholars including Alan Januszewski and Michael Molenda—went on

to explain (2007) that: (a) "ethical" practice necessitates understanding the power position of those designing and developing learning and performance interventions—by considering questions such as who is included, who is empowered, and who has authority during these processes; and (b) "appropriate" interventions are those that are connected with local users and cultures. The Committee also invoked AECT's Code of Ethics document to underscore that said interventions must avoid content promoting gender, ethnic, racial, or religious stereotypes; emphasize social/cultural diversity; and reflect culturally and intellectually diverse viewpoints. [Incidentally, AECT has since appeared to have removed the word "appropriate" from the subsequent revision—and current iteration—of its definition of the field, although the word "ethical" remains.]

Besides, as Varkey (2021) notes, beneficence, nonmaleficence, autonomy, and justice constitute the four principles of ethics. Transposing these into the context of teaching and learning: (a) beneficence obliges the teacher to act for the benefit of the learner; (b) nonmaleficence obliges the teacher to do no harm to the learner; (c) autonomy obliges the teacher—based on the understanding that all learners possess intrinsic and unconditional worth—to allow each learner to exercise their capacity for self-determination; and (d) justice obliges the teacher to treat all learners in a fair, equitable, and appropriate manner—while also subsuming the concept of distributive justice, referring to the fair, equitable, and appropriate distribution of educational resources among learners. Each of the four ethical principles above oblige the teacher to do everything in their power to better engage the socioeconomically and culturally diverse learners within today's post Covid-19 blended teaching and learning contexts.

As mentioned in Subramony (2021), Thomas M. Schwen—eminent performance technologist and my doctoral advisor at Indiana University—often used to quip, back in the early 2000s when I was his student, that "We have only recently become proficient enough to do harm." One of the (many) things he was hinting at with this statement was that we educational technologists as a field had only recently arrived at that fateful juncture in human history where our scholarship and our praxis were starting to impact substantial numbers of stakeholders who had hitherto not experienced the dubious privilege of receiving our attention—including those belonging to historically underrepresented, underserved, and marginalized groups, and those living in parts of the world far removed from the Western socioeconomic and cultural realm. These are the very stakeholders whom this chapter focuses on helping teachers better engage.

Let us now proceed to establish and describe the specific contextual factors pertinent to the current era—namely, pandemic pedagogy, learner engagement, and the problematic pandemic-era digital divide—that will frame our discussion going forward.

Pandemic Pedagogy

The term 'pandemic pedagogy' may possibly have been coined on March 11, 2020, when Roy Schwartzman created a Facebook group with the title of Pandemic Pedagogy for stakeholders to share insights, best/worst practices, advice, successes, challenges, and

research about converting to fully remote/online instruction during the SARS-CoV-2 pandemic (see Schwartzman, 2020).

This term—which many of us may have been forced to become intimately acquainted with since March of 2020—has usually been perceived as being synonymous with the 'emergency' remote teaching and learning to which educational institutions worldwide had to hurriedly resort following the global spread of multiple variants of the SARS-CoV-2 virus. However, as Bautista (2021) explains, pandemic pedagogy was not simply about the shift in the format of conducting one's classes. The term conceptually speaking referred to a mindset in which educators adapted to the sudden major upheaval of our temporal and spatial agencies, and practically speaking referred to the problem-solving and troubleshooting mentalities required to simultaneously: (a) (re)design and adapt curricula to new formats and timeframes; (b) implement measures aimed at alleviating feelings of isolation, fatigue and anxiety among learners and educators; and (c) realign performance indicators to measure how technologically-mediated learning platforms are oriented towards achieving teaching continuity and learning inclusion (emphasis added). It is the latter goal on which this Chapter seeks to focus while exploring the issue of engaging socioeconomically and culturally diverse learners within the 'post' pandemic pedagogy contexts that have now become virtually ubiquitous across the globe.

Learner Engagement

Within any teaching/learning context, engagement can be characterized as a two-way process in which: (a) learners are primarily responsible for engaging with—as in, actively interacting with and critically examining—the instructional content; while (b) instructors are responsible for initiating learner engagement—because learner engagement may not happen on its own—and actively engaging learners through effective instructional design (Arghode, Brieger, & Wang, 2018).

Besides, learner engagement is increasingly seen by scholars as a complex construct encompassing several dimensions of participation in learning activities, because not all engaged learners manifest their engagement in an identical manner (Deng, Benckendorff, & Gannaway, 2019). It involves the learner not only engaging just with the instructional content alone, but also engaging with the instructor/instructional program, and engaging with peers/fellow learners. In fact, Arghode, et al., based on their extensive review of the literature on the topic, enumerate four primary, interrelated, and interactive categories—behavioral, emotional, cognitive, and psychological—of learner engagement that each vary along a continuum:

1. Behavioral engagement involves the learner demonstrating productive classroom behavior by complying with rules and classroom norms;
2. Emotional engagement refers to the learner's interest/affinity to engage with the content as indicated by their positive body language and attachment to learning;
3. Cognitive engagement describes the learner's interest in learning not just the expected content but also that which is beyond curricular expectations; while

4. Psychological engagement encompasses the learner's sense of identification or belonging, and positive relationships with their instructors and peers—this category can alternatively be labeled 'social' engagement (see Deng, et al., 2019).

Deng, et al. underscore the importance of improving learner engagement by drawing attention to growing evidence of it playing a pivotal role in successful learning and teaching, with engagement being associated with favorable learning outcomes, and disengagement being linked to adverse effects on academic achievement, including dropout, school failure, and serious behavioral problems.

Meanwhile, Arghode, et al.—referencing 'learner engagement theory' (Handelsman, Briggs, Sullivan, & Towler, 2005), which posits that learning is improved through learners' active involvement with the instructional content both inside and outside the classroom—describe how increased learner engagement improves learning, academic performance, and instructional effectiveness, and characterize it as a way to embrace active and collaborative learning, participation in challenging academic activities, and formative communication with the instructor. They explain how, from the learner's end, engagement involves (a) actively interacting with and critically examining the instructional content at the cognitive, behavioral,emotional, and psychological levels, (b) devoting more time and effort to focus on learning, (c) being able to transfer their learning to dissimilar situations, and (d) taking effort to improve their learning even outside of class; while from the instructor's end, engaging instruction (a) capitalizes on learners' desire and willingness to actively learn, (b) motivates them to be involved in learning by fueling their passion and inclination to study, and (c) effectively uses the learners' preexisting knowledge and skills to promote engagement.

Pandemic-Era Digital Divide

Improving engagement by diverse learners within the 'post' pandemic pedagogy contexts of the Covid-19 era and after is rendered exponentially more crucial—and, at the same time, exponentially more challenging—by the significant exacerbation of the digital divide since the arrival of the SARS-CoV-2 virus. While the pandemic has speeded up the global transition towards a digital economy by accelerating the uptake of digital solutions, tools, and services, it has simultaneously exposed the wide chasm between the connected and the unconnected (UNCTAD, 2020). The pandemic has increased the digital divide—i.e., the inequitable distribution of access to, competencies with, and use of digital technologies based on factors such as age, geography, geopolitics, socioeconomics, and so on—at both macro (e.g., school system) and micro (i.e., individual learner) levels (Eskiadi, 2020).

Context Analysis

Ever since Martin Tessmer & Rita Richey introduced the theoretical lens of context analysis in their seminal 1997 Educational Technology Research and Development (ETR&D) article, it

has become fundamental to the instructional systems design (ISD) perspective, given how strongly it underscores ISD's focus on performance gaps in contrast to the content focus of traditional curriculum designers. While ISD practitioners see context analysis as an integral part of the first (Analysis) phase of the generic Analysis-Design-Development-Implementation-Evaluation (ADDIE) ISD process model, this key step is often given less attention than it deserves by us educators when we go about delivering blended instruction, which is problematic because basing our instructional praxis on thorough context analysis can dramatically help improve learner motivation and engagement, especially in blended learning situations. The above-referenced article explicated three distinct types of context—namely, the orienting, instructional, and transfer contexts—that are all vital to take into account when teaching, and even more so when teaching in a blended or all-online format.

As Tessmer & Richey (1997) explained, the orienting context precedes the learning event and contains key factors influencing the learner's motivation and cognitive preparation with regard to learning, thus determining in part "the cognitive and affective 'set' the learner brings" (p. 91) with them. Learners tend to be more positively oriented towards instruction that is congruent with their social, cultural, and moral worldviews. Previous learning or other experiences can also shape a learner's orienting context—"a teacher or supervisor's comments about an upcoming class can determine the level of motivation a student brings to it even though it may occur days or weeks before the instruction." (p. 90). To provide a more dramatic example, I was loath to take driving lessons for years due to experiencing, in my late teens, a short-tempered, bigoted individual's grossly unpleasant and ineffective attempts to teach me how to drive. As a consequence I did not manage to learn driving until I was in my early 30s.

Thus, for better engaging socioeconomically and culturally diverse learners, understanding their orienting contexts is critical to success in this regard. What was these learners' previous experience receiving instruction in the given subject/topic area? Was it positive, respectful, affirming, empowering, and effective, or was it unpleasant, disrespectful, rejecting/dismissive, marginalizing, and ineffective? From the standpoint of socioculturally cognizant praxis, taking learners' orienting contexts into account involves can help render our instructional content and delivery more relatable to and better reflective of every learner whose needs we serve; we cannot expect learners to be favorably oriented towards—and thus optimally motivated and engaged by—instruction that they were previously traumatized by, or that they see as being socially, culturally, or morally irrelevant, ignorant/oblivious, insensitive, or downright offensive to their self. Unless we know where our learners are coming from, we will have a difficult time figuring out where/how to meet them, and where/how to proceed from there.

Meanwhile, the instructional context—which the authors note has merited the most consideration from educators in the past—comprises the factors and environments directly involved in instructional delivery, i.e., the immediate physical, social and symbolic resources outside the learner's person. Effectively fulfilling various learning objectives logically requires various instructional contexts—to give some obvious examples, swim lessons typically require the instructional context of a pool, baking lessons require the presence of baking equipment, and firefighting lessons may well require the presence of fire and fire-retardants. Oftentimes when real-world contexts are too costly/unsafe/impractical, the instructional

context uses simulations—e.g. cockpit flight simulators to train pilots, or aircraft cabin mockups to train flight attendants.

The instructional context is where we, as socioculturally cognizant teachers, have the best opportunity to do whatever is within our power to mitigate our society's preexisting digital divide that—as we discussed earlier on in this chapter—the Covid-19 pandemic so starkly exposed and brutally exacerbated. As K-12 schools and postsecondary institutions across the nation switched literally overnight to emergency remote operations, I encouraged the in-service educators I teach to pay close attention to the issue of student access to instructional contexts that are essential for remote learning to be feasible—which requires us to step out of our own positions of relative privilege and put ourselves in our most marginalized students' shoes:

What if your instructional context at home was not as conducive to learning as that of your school? Maybe you were lucky enough to be enrolled at a school that had adequate technological infrastructure and an environment conducive to learning; but what if you subsequently had to spend months trying to remote-learn from a home that did not have reliable internet access? What if your home did not provide a quiet, dedicated space where you could attend Zoom lessons and do your homework? What if you had to deal with noisy, disruptive, or abusive family members who made it impossible for you to concentrate on your schoolwork? What if your home was located in a high-crime area, and you woke up one day to find your irreplaceably expensive laptop or tablet stolen? What if you woke up one freezing morning and found the electricity and heat cut off due to your folks being unable to pay their utility bills? What if your home was a car? What if the free or reduced lunches provided at school represented your only opportunity to eat a nutritious meal during the day?

Incidentally, the idea of learners' performance being influenced by contextual factors—i.e., those outside of the instructional content we transmit and the instructional strategies we employ—is not a new one; rather, it is something human performance technology (HPT) specialists have been talking about for decades—see Molenda & Pershing (2004) for a pioneering, exhaustive discussion of non-instructional factors affecting human performance. As I frequently reminded my in-service teachers, a new iPad would not be of much help if the learner was cold, hot, or hungry, if their chair was uncomfortable, if they had no safe and quiet place to study, and if they were constantly faced with threats to their physical and emotional health and safety. What could help learners stuck during the pandemic in unfortunate instructional contexts outside of physical school campuses perform better at remote learning? Was the answer more textbooks, more Zoom lessons, more learning apps, more testing? Was it easier access to broadband internet and personal computing devices? Was it safety, privacy, nutritious food, emotional support, and role models? Given that resources were generally limited, what sort of performance interventions could give us the most bang for the buck?

Finally, by transfer context Tessmer & Richey refer to the environment in which the learning will be applied following the instructional experience—the 'payoff' context for which the learning is ultimately justified. For instance, if a group of learners is fulfilling a curricular 'requirement' by is taking a course in, say, French or German, but they have no plans in the foreseeable future to interact with native speakers of those languages, or to read works or to watch films in those languages, then they might have precious little incentive—barring an

innate love to learn a language for the sake of learning a language—to put much effort into retaining whatever they learn in said course. On the other hand, if an optional self-defense class is offered to residents of a neighborhood plagued by violent crime, whoever signs up for it is likely to pay close attention because they understand they might need to put their learning to use literally as soon as they step out the classroom door.

As I illustrated several years ago—see Subramony (2006) and Subramony (2009)—learners are not motivated by and will not be inspired to engage with content/information that they don't see as being relevant to their respective sociocultural environments/milieux, or those they see as potentially distancing them from their people and culture; on the contrary, such content sadly risks alienating them from the empowering, emancipatory potential of education. In the aforementioned articles I detailed how instruction delivered within the extremely expensive, technology-rich learning environments provided by institutions within the North Slope Borough School District in the far north of Alaska failed to motivate and engage native Iñupiat learners since they did not see the state's mainstream K-12 curriculum as being transferable to their local environment; rather, getting qualified and pursuing careers in, say, STEM fields, would most likely require leaving—probably on a long term, if not permanent, basis—their native communities within the Alaskan Arctic and relocating to more 'mainstream' parts of the country. While this may seem like a rather extreme example, similar dynamics have long been seen playing out worldwide, across historically underrepresented and marginalized learner groups—see Willis (1977) for a pioneering account of this phenomenon amongst working-class youth within the economically depressed Rust Belt of northern England.

Cognitive Load

Cognitive load is a valuable theoretical lens developed out of a study of problem solving by John Sweller (see Sweller, 1988) that can help us better figure out how to better engage socioeconomically and culturally diverse learners within blended learning situations. As Sweller (2020) explains, cognitive load theory sees the major aim of instruction as facilitating the transfer of information from (a) the external environment into working memory and (b) subsequently from working memory into long-term memory; and once the information is stored in long-term memory, it can be (c) transferred back to working memory to govern appropriate action as needed.

Sweller also usefully differentiates between intrinsic and extraneous cognitive load—a distinction that is absolutely imperative for us teachers to understand as we go about facilitating instruction within blended learning environments. Intrinsic cognitive load "is determined by the intrinsic properties of the information being processed (and) can be altered only by either changing the subject matter … or by changing the (learner's) knowledge base." (2020, p. 9) For instance, the intrinsic cognitive load involved in learning integral/differential calculus is higher than that involved in learning algebra, which, in turn, is higher than that involved in learning arithmetic—hence the rationale for changing the learner's knowledge base in anticipation by means of prerequisites, e.g. learning arithmetic

as a prerequisite to learning algebra, and the latter in turn as a prerequisite to learning calculus.

Meanwhile, extraneous cognitive load "is determined by instructional procedures," (2020, p. 9), some of which unnecessarily increase extraneous cognitive load. One of the most crucial points Sweller makes is that "the vast majority (emphasis added) of the cognitive load effects are due to changes in extraneous cognitive load." (2020, p. 9) For example, as a foreign-born professor at a US university, I am keenly aware that my unfamiliar accent in English might add to my American students' extraneous cognitive load. To reduce this, I make sure to enunciate slowly and clearly, I try to catch the more 'troublesome' aspects of my pronunciation before the words come out of my mouth, and I repeatedly remind my students to let me know the moment they don't understand something that I am saying, so I can fix it then and there.

Besides, Sweller discusses the related concept of germane cognitive load (see Sweller, 2010), which refers to the working memory resources devoted by learners to deal with the intrinsic cognitive load associated with a given piece of information. In optimal learning situations where intrinsic cognitive load is high and extraneous low, germane cognitive load —and thus learning—will be high because the learner is able to devote the majority of their working memory resources to deal with the essential instructional content; conversely, in suboptimal learning situations where extraneous cognitive load is higher, germane cognitive load—and thus learning—will be lower because the learner is forced to use their working memory resources to deal with the extraneous elements imposed by the instructional procedure rather than the instructional content. In my example above, if my unfamiliar accent is too challenging for my American students, they will be forced to use more of their working memory resources to make sense of how I speak, leaving them with fewer resources to make sense of what I am saying—which would definitely be a suboptimal learning situation.

When it comes to better addressing the needs of socioeconomically and culturally diverse learners within the blended learning situations characterizing today's post pandemic pedagogy era, taking the different types of cognitive load into consideration is vital. Given that blended/online learning is clearly here to stay—at all educational levels—it is important that learners continue to be able to devote as much of their working memory resources to deal with the instructional content as they were during traditional, pre-pandemic face-to-face learning; i.e., going forward, our blended learning environments also need to create those optimal learning conditions where intrinsic cognitive load is high, extraneous low, and thus germane cognitive load is high.

Harking back to our discussion in the preceding section regarding learners who were stuck in unfortunate instructional contexts outside of physical school campuses during the emergency remote learning phase at the height of the Covid-19 pandemic, it should not be difficult to envision the quantum of extraneous cognitive load these learners could have been burdened with during that ordeal. Imagine how much germane cognitive load—the working memory resources devoted by learners to deal with the intrinsic cognitive load associated with given instructional content—could have shrunk as a result of having to deal with any or all of the following drains on one's mental and emotional resources: (a) A slow, weak, unreliable internet connection; (b) Inadequate screen size of the web-enabled device

one had access to; (c) A cramped, uncomfortable, badly lit, inadequately heated/cooled study space; (d) A noisy, distracting/disruptive, or downright hazardous physical environment; (e) Lack of access to basic human needs such as housing, adequate nutritious food, or electricity?

Social Constructivism

Social constructivism is another widely known theoretical lens that is very helpful in guiding us teachers as we seek to better engage socioeconomically and culturally diverse learners within blended learning situations. It derives from celebrated Soviet psychologist Lev Vygotsky's idea (see Vygotsky, 1978) of cognitive development as a socially mediated process during which humans acquire cultural values, ideological beliefs, and practical problem-solving strategies via collaborative dialogues with more knowledgeable and experienced members of society. Vygotsky highlighted the fundamental role of social interaction in the development of human cognition, stressing the central role played by community in the individual process of meaning-making.

From a practical standpoint, social constructivism sees interaction, collaboration and group work as being crucial to enabling effective learning; social constructivist teaching methods can consequently be grouped into two overarching categories, i.e., discussion and group work (Akpan, Igwe, Mpamah, & Okoro, 2020). The authors emphasize the teacher's role in guiding interaction during discussion, and highlight the method's role in (a) helping learners evaluate diverse opinions by developing tolerance and respect for views that are incompatible with their own worldviews; and (b) promoting democratic thinking among learners as they freely share ideas and challenge each other to (hopefully) arrive at a mutually agreeable consensus. Meanwhile, engaging in group work capitalizes on the power of social constructivist learning to help learners acquire skills they can recognize as being critical for success in the 21st century.

As I have detailed in Subramony (2004) and multiple subsequent works, pre-existing factors such as inequitable access to resources and services, sociocultural and linguistic barriers, and lack of role models have tended to alienate historically underrepresented and marginalized learner groups from the empowering, emancipatory potential of education and technology. When we add inappropriate and/or insensitive instructional interventions to this already sub-optimal context, it only serves to alienate these already vulnerable and disadvantaged learners even further, setting off a vicious cycle of alienation and disempowerment in motion.

Learners from non-Western backgrounds often find the fiercely individualistic, hyper-competitive, winner-takes-all ethos inherent in Western educational systems culturally incompatible with their own values. When implemented in an intentional, culturally cognizant manner—i.e., with proper scaffolding and guidance, and a mature grasp of the myriad pitfalls related to group dynamics, power differentials, and, in blended learning environments, the logistics—social constructivist approaches including discussion and group work can help us engage these learners by (Akpan, et al., 2020):

(a) discouraging emotionally unhealthy levels of competition while encouraging healthy collaboration and safe sharing of all learners' lived experiences;

(b) Ensuring that all learners feel secure enough to freely ask and answer questions, interact and contribute to the classroom discourse;

(c) Helping all learners become co-custodians of knowledge as they share and build on their previous experiences to create new knowledge;

(d) Encouraging all learners to appreciate and investigate new ideas from peers; and

(e) Promoting self-esteem among all learners based on a trust-in-self approach to learning where learners are guided to believe in their capacity to perform well.

Proximal/Distal Factors

This is a relatively novel construct introduced to the ISD literature by Molenda & Subramony (2021), symbolized by a detailed chart—titled the Molenda-Subramony Framework of the Forces Affecting Instructed Learning, henceforth referred to simply as "the Framework"—summarizing the veritable universe of proximal and distal forces/factors/variables which directly or indirectly influence, to varying degrees, what the authors conceptualize as instructed learning—as in, learning that is the outcome of formal, intentional instruction, as opposed to experiential, incidental, accidental, or any other potential forms of learning. While I am unable to reproduce the actual chart itself herein—readers can locate it on p. 32 of Molenda & Subramony (2021)—due to obvious copyright restrictions, I would like to succinctly explain, in this section, how its postulates apply to our discussion at hand—which they do to a considerable extent.

The Framework makes a distinction between a set of proximal factors directly affecting instructed learning, and three—progressively distal—sets of factors that affect instructed learning indirectly. Proximal factors include: (pa) the learner's aptitude, intelligence, prior achievement, and pre-existing subject knowledge; (pb) the actual effort put in by the learner to learn; and (pc) the instructional methods and resources used. Meanwhile, first-level distal factors include: (d1a) the learner's psychological traits, viz., self-efficacy, locus of control, maturational level, and personal interests; (d1b) the learner's psychological state, viz., expectancies, valuations, situational interest, and motivation to learn; and (d1c) the self-efficacy, expectancies, valuations, interest arousal, and pedagogical choices of the instructor/facilitator. Proximal and first-level distal factors both primarily operate within the learner's classroom environment—whether said classroom be a brick-and-mortar, blended, or virtual entity.

Second-level distal factors indirectly affecting instructed learning include: (d2a) home/family influences, viz., home environment and parental/caregiver education; and (d2b) peer influences, viz., cliques, and peer behavior modeling. The former influences primarily operate within the learner's sociocultural environment, while the latter operate within both sociocultural and school environments—keeping in mind that the classroom environment is

a subset of the school environment, which, in turn, is a subset of the sociocultural environment; the three are akin to Ukrainian nesting dolls. Finally, third-level distal factors include the influences of: (d3a) mass media; and (d3b) social media. These operate primarily within the learner's sociocultural environment. The Framework also acknowledges the role of the larger 'frame' factors—viz., time, and physical/virtual surroundings—that circumscribe the instructed learning process and act as affordances or constraints on all of the aforementioned proximal/distal factors.

It should not be difficult to see how an understanding of the proximal and distal factors that directly or indirectly influence instructed learning could provide us with powerful guidance as we seek to better engage socioeconomically and culturally diverse learners within blended learning situations. To put it briefly, it boils down to what we can control, influence, or be cognizant of, as we go about serving the needs of all learners. Clearly, as teachers we can do our best to control: (a) the instructional methods and resources used; and (b) our self-efficacy, expectancies, valuations, interest arousal, and pedagogical choices. Meanwhile, factors we may not be able to directly control but definitely can attempt to indirectly influence include: (a) the effort put in by the learner to learn; (b) the learner's expectancies, valuations, situational interest, and motivation to learn; and (c) peer influences—those which manifest within the classroom environment that we directly control. Finally, all of the remaining factors may be well beyond our direct control or even indirect influence—we can certainly try!—but at the very least we can intentionally be cognizant of and monitor for potential negative impacts on the learners entrusted to our care and tutelage—especially those vulnerable individuals hailing from historically underrepresented and marginalized groups.

Communication Configurations

The fifth, and last, theoretical lens we shall discuss in this chapter—in terms of its potential to help us better engage socioeconomically and culturally diverse learners within blended learning situations—is communication configurations, which represent yet another novel construct introduced to the ISD literature by Molenda & Subramony (2021). Frequently confounded with instructional 'methods' or learning 'strategies' throughout the field's history —Smaldino, Lowther, & Mims (2019, pp. 66-74) serves as an influential recent exemplar—the seven fundamental communication configurations presented by Molenda & Subramony (2021) represent seven distinct, non-overlapping, mutually exclusive arrangements of what the authors deem as constituting the five basic elements—learner, teacher/instructor/facilitator, resources, setting, and communication pattern—that visibly feature within a given instructional event, i.e., the time and place at which instructed learning occurs.

These seven configurations include:

(a) Presentation—A teacher or instructional resource conveys information one-way to multiple learners, while controlling the flow of communication;

(b) Demonstration—A teacher/resource displays and explains a process, procedure, or task to multiple learners, while controlling the flow of communication;

(c1) Discussion: Whole-Class—A teacher engages the whole class in a conversation in which learners share information/opinions, with the teacher remaining at the center, setting the agenda and controlling the flow of communication;

(c2) Discussion: Small-Group—Two or more learners share information/opinions without a teacher's inputs; the teacher may set the agenda and control logistics, but learners control the flow of communication within their group(s);

(d) Tutorial—A teacher/device interacts, intensively and substantively, one-to-one with a learner, with the pair sharing control of two-way communication;

(e) Repetition—A learner repeatedly performs a skill to improve retention/proficiency;

(f) Study—A learner interacts with instructional/real-world/inner resources, without direct teacher supervision, but often inspired/guided by the teacher; the learner is in control of events, deciding exactly what to do and when to do it; and

(g) Expression—A learner creates a tangible artifact to process new knowledge or attitude(s); a teacher may structure/monitor the experience, but the learner controls what is created and how it is created.

These configurations can—alone or in combination—spawn diverse instructional methods, each of which stands to open up unique opportunities for engaging learners in inclusive, empowering ways. Presentations and demonstrations can be rendered learner-centric—following a constructivist approach—by having them be led by individual learners or—reflecting a social constructivist ethos—by cooperative teams of learners, after the latter have studied the relevant content resources. This can subsequently be supplemented with whole-class and/or small-group discussions to capitalize on learners' collective intelligence and further the creation of a true learning community. Expression—which results in learners creating tangible products or artifacts—following a period of study allows for constructivist methods such as inquiry learning and problem-based learning that can, once again, be accomplished by learners either individually or in teams. It should be clear by now that the range of possibilities is immense; and furthermore, the creative, inventive, and innovative integration of technology by teachers can permit the adaptation and optimization of these methods for implementation within blended learning environments, so long as simultaneous efforts are taken to reduce the persistent digital divide within our society that currently makes blended learning an inequitably uneven playing field.

Complementariness of the Aforementioned Perspectives

To begin, let me express suitable regret for employing such an ungainly—albeit grammatically correct—noun in the above section heading. That said, the purpose of this section is to draw attention to something the reader must clearly have noticed already; I am referring to the manner in which the five theoretical perspectives discussed within this chapter neatly, elegantly, and appealingly complement each other, when it comes to helping us teachers better figure out how to better engage socioeconomically and culturally diverse learners within blended learning situations.

For instance, the connection between the instructional context and extraneous cognitive load is undeniable—the latter by definition being generated within the former—and thus paying appropriate attention to the instructional context of a learning event gives us a chance to reduce the extraneous cognitive burden—much of which can be directly caused by socioculturally incognizant, insensitive, or blatantly offensive instructional content/methods—on the learner. Communication configurations—and various inclusive, empowering, social constructivist instructional methods and learning strategies that can potentially derive from them—operate within the instructional context as well; meanwhile, in order to enable effective teaching and meaningful learning said methods and strategies undeniably need to take the orienting contexts of target learners and transfer contexts of instructional interventions appropriately into account. Furthermore, the pedagogical choices made by the teacher that results in instruction being socioculturally cognizant, sensitive, and appropriate—or not—form part of the first-level distal factors detailed in the (Molenda-Subramony) Framework; besides, all the proximal and distal factors covered by the Framework with the exception of factors pc and d1c directly contribute to the learner's orienting context.

It is easily possible to discern numerous further connections between the five theoretical perspectives discussed in this chapter, and I encourage the reader to engage (pun intended) in such an exercise. Unearthing these connections allows us teachers to develop a holistic understanding of the myriad factors and considerations related to optimally engaging socioeconomically and culturally diverse learners within blended learning situations. To underscore this point I would like to draw from my Indian cultural roots and invoke the old fable of the Six Blind Men and the Elephant; after each of the six men restrictively focused on a separate part of said creature and consequently arrived at wildly (pun unintended) erroneous understandings—a snake, a pillar, a fan, a rope, a wall, a spear—they realized it made more sense to combine their six perspectives and thus generate a far more accurate interpretation of reality.

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References

Akpan, V. I., Igwe, U. A., Mpamah, I. B. I., & Okoro, C. O. (2020). Social constructivism: Implications on teaching and learning. British Journal of Education, 8(8), 49-56.

Arghode, V., Brieger, E., & Wang, J. (2018). Engaging instructional design and instructor role in online learning environment. European Journal of Training and Development, 42(7/8), 366-380.

Bautista, J. (2021, January). From the editor – Pandemic pedagogy: teaching continuity in times of global disruption. Kyoto Review of Southeast Asia, 29. Retrieved from https://kyotoreview.org/pandemic-pedagogy/teaching-continuity-in-times-of-global-disruption/

Definition and Terminology Committee of the Association for Educational Communications and Technology. (2007). Definition. In A. Januszewski and M. Molenda (Eds.), Educational technology: A definition with commentary (pp. 1-14). New York, NY: Routledge.

Deng, R., Benckendorff, P., & Gannaway, D. (2019). Learner engagement in MOOCs: Scale development and validation. British Journal of Educational Technology, 51(1), 245–262.

Eskiadi, I. G. (2020). Bridging the gap: the digital divide in times of COVID-19. Retrieved from https://gdc.unicef.org/resource/bridging-gap-digital-divide-times-covid-19

Handelsman, M.M., Briggs, W.L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. The Journal of Educational Research, 98(3), 184-192.

Molenda, M., & Pershing, J. A. (2004). The strategic impact model: An integrative approach to performance improvement and instructional systems design. TechTrends, 48(2), 26-32.

Molenda, M. H., & Subramony, D. P. (2021). The elements of instruction: A framework for the age of emerging technologies. New York, NY: Routledge.

Schwartzman, R. (2020). Performing pandemic pedagogy. Communication Education, 69(4), 502-517, DOI: 10.1080/03634523.2020.1804602

Smaldino, S. E., Lowther, D. L., & Mims, C. (2019). Instructional technology and media for learning, 12th ed. New York, NY: Pearson Education.

Subramony, D. P. (2004). Instructional technologists' inattention to issues of cultural diversity among learners. Educational Technology, 44(4), 19-24.

Subramony, D. P. (2006). Culturally and geographically relevant performance interventions: A case study from Arctic Alaska. Performance Improvement Quarterly, 19(2), 115-134.

Subramony, D. P. (2009). Understanding minority learners' complex relationships with education and technology. Educational Technology, 49(6), 14-19.

Subramony, D. P. (2017). Revisiting instructional technologists' inattention to issues of cultural diversity among stakeholders. Ch. 3 (pp. 28-43) in R. Joseph & J. L. Moore (Eds.), Culture, learning and technology: Research and practice. New York, NY: Routledge.

Subramony, D. P. (2021). On being proficient enough to do (no) harm: Reflections on mentoring visiting Saudi Arabian K–12 teachers. Pp. 179-202 in I. Lubin (Ed.), ICT and international learning ecologies: Representation and sustainability across contexts. New York, NY: Routledge.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257-285.

Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. Educational Psychology Review, 22, 123-138.

Sweller, J. (2020). Cognitive load theory and educational technology. Educational Technology Research and Development, 68, 1-16.

Tessmer, M., & Richey, R. C. (1997). The role of context in learning and instructional design. Educational Technology Research and Development, 45(2), 85-115.

United Nations Conference on Trade and Development (UNCTAD). (2020). Coronavirus reveals need to bridge the digital divide. Retrieved from https://unctad.org/news/coronavirus-reveals-need-bridge-digital-divide

Varkey, B. (2021). Principles of clinical ethics and their application to practice subject area: General medicine. Medical Principles and Practice, 30(1), 17-28.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Willis, P. (1977). Learning to labor: How working class kids get working class jobs. New York: Columbia University Press.

Deepak Prem Subramony

Deep Assumptions and Data Ethics in Educational Technology

Greenhalgh, S. P.

Assumptions | Data | Educational Technology | Ethics

Deeper assumptions frequently shape the ways educational technology stakeholders collect and use data. This influence of assumptions on data decisions makes it critical that educational technology stakeholders engage with deeper assumptions as part of ethical considerations; indeed, they are key to ensuring that stakeholders engage with structural issues in education and educational technology rather than use ethical compliance as a superficial nod to questions of justice, harm, and power. In this chapter, I illustrate the relationship between deep assumptions and data ethics by considering assumptions related to four broad questions about the purpose of education, the purpose of educational technology, the determination of quality in educational (technology) research, and who has what say in these domains. Debates about data ethics are often better understood as debates about these

deeper assumptions, which must be surfaced to consider data ethics in our field thoroughly.

Introduction

In the opening chapter of his book *Language and Power*, Fairclough (1989) argued that because language had become increasingly important worldwide, people were not paying it enough attention. In particular, Fairclough sought to draw the reader's attention to two relationships: first, the "extent to which their language… rest[s] on common-sense assumptions " (p. 4), and second, the ways in which those assumptions might reflect undesirable social organizations and power imbalances. As a French teacher turned researcher of data-rich technologies, it is perhaps fitting that my purpose in this chapter is to echo Fairclough's arguments about language in the context of data. That is because data have become increasingly important in educational settings, educational technology stakeholders are not paying them enough attention. Such attention, I suggest, will reveal that the ways that we—and others—approach data represent deeper assumptions about our work that often go unquestioned or unchallenged—but that often create or maintain unjust power relations between involved parties.

To illustrate this point, consider an exchange I once had with the help desk for the Canvas Learning Management System (LMS). I was frustrated with Canvas's use of *cookies*—small chunks of data stored on computers to track internet users—to welcome first-time users of the LMS. Because companies often use cookies for undesirable online surveillance, I use a web browser that blocks most of them. While it was possible to use Canvas without consenting to this particular cookie, it created considerable annoyance—every time I opened Canvas in a new tab, I received a pop-up welcome message, despite the many hours I had logged in the LMS. I explained the situation in pleading tones to the Canvas help team only to receive a discouraging reply: "I totally get that… However, with Canvas being an educational software, it does have to be tracked." I was struck by how this employee described this use of data not as defensible in and of itself but rather as a natural conclusion of how things work: because Canvas is educational software, it must engage in tracking. For this employee, it followed that users like me should consent to that tracking or be prepared to deal with disruptive consequences. This "common-sense assumption" that educational technology must engage in tracking (and is therefore unconditionally justified in doing so) is frighteningly far-reaching—indeed, the employee seemed to overlook that this particular use of cookies was not actually tracking educational performance outcomes. Some data must indeed be collected and analyzed for teaching and learning to happen, but if educational software is therefore given a pass for all forms of tracking, where are the limits for intrusion into personal and private lives?

Throughout this chapter, I elaborate on my argument that the ethical and just collection and use of data in education partly depends on acknowledging, evaluating, and even challenging often-unspoken assumptions about education, educational technology, and research in both of these umbrella disciplines. After establishing the purpose and scope of this chapter, I

illustrate how deep assumptions about education inform data ethics by considering four questions:

- What is the purpose of education?
- What is the purpose of educational technology?
- What determines quality in educational (technology) research?
- Who has what say in these domains?

In addressing these questions, my purpose is not to answer them myself but to demonstrate how different answers might change the ethical calculus involved in data decisions in our discipline. Nonetheless, before concluding the chapter, I provide one example of how these questions might inform educational technology stakeholders' ethical decision-making.

Purpose and Scope

In this section, I clarify my intended purpose for this chapter. One genre of papers on data ethics in education is the checklist for ethical data use (e.g., Drachsler & Greller, 2016). However, it is important to emphasize that data-rich technologies raise difficult issues that defy simple approaches (boyd & Crawford, 2012); although a checklist may be genuinely useful, it is important that stakeholders not get locked into a simplistic, rote view of ethical compliance. For example, while compliance with legal and institutional frameworks is important, it does not represent the sum of one's ethical responsibilities (Beardsley et al., 2019; Drachsler & Greller, 2016; Mandinach & Gummer, 2021a). Indeed, stakeholders must recognize ways in which ethical and just action may even stand in tension with those frameworks (Corrin et al., 2019; Fiesler et al., 2020). In this vein, other authors (e.g., Corrin et al., 2019; Hakimi et al., 2021) stop short of specific steps, instead articulating or synthesizing guiding principles that have informed or can inform individual, context-dependent decisions about ethics.

However, some authors argue that ethics may be the wrong focus when making these considerations. For example, Green (2021) suggests that an ethics perspective is incapable of adequately addressing social justice issues related to data-rich technologies and methodologies—and that it even runs the risk of "deploying the language of ethics to resist more structural reforms" (p. 250). boyd and Crawford (2012) complicate things further, suggesting that the mere acceptance of the *big data* phenomenon entails accepting new ethical perspectives, demanding a thorough evaluation of not just ethics *within* data-rich approaches but also the ethics *of* data-rich approaches. In response to these challenges, D'Ignazio and Klein (2020) suggest that a commitment to *data justice*—beyond individual decisions and particular technologies to interrogate deeper, structural issues—is more appropriate than a commitment to *data ethics*. Educational technology needs such interrogation; for example, in a feminist autoethnographic treatment of her experience as an Afro-Latinx woman, Romero-Hall (2022) describes several ways in which the field of educational technology has privileged White, male perspectives at the expense of others (see also, e.g., Donaldson, 2016). Even a deep commitment to ethical decision-making will not necessarily compensate for these structural influences.

Thus, even when I refer to "ethics" in this chapter, I intend to go deeper (and invite my reader to go deeper) than checklists or principles. Nevertheless, although some of my own opinions will surely be clear from my writing, I also stop short of offering a specific theory or framework of justice that should guide our collection and use of data in educational technology. In diverse disciplines—such as our own—Green (2021) argues that perfect consensus is less important than a willingness to surface debates between perspectives that often remain implicit. Therefore, my purpose in this chapter is to illustrate how educational technology stakeholders' unspoken assumptions (and the perspectives and structures they are informed by and inform) guide specific decisions about data. My hope is that readers will respond by not only identifying the ways that their assumptions inform their approach to educational data but also questioning those assumptions in a way that invites further ethical reflection.

Given this purpose, the scope of this chapter is necessarily broad in some ways and necessarily narrow in others. In the first respect, I understand the word *data* broadly—not just as the digital or so-called "big" data that have brought additional prestige to the term (see boyd & Crawford, 2012), but rather as "any type of information that is systematically collected, organized, and analyzed" (D'Ignazio & Klein, 2020, p. 14). Likewise, I follow Molenda (2008) in using the term *educational technology* to refer broadly to many disciplines that are interested in how learning and teaching intersect with technology (compare with Romero-Hall's [2021] similar use of *learning design and technology*). Furthermore, I acknowledge that stakeholders in educational questions of ethics and justice relating to data and technology are not limited to even this broad collection of disciplines. Indeed, to truly consider the deeper, structural issues that I privilege in this chapter, it is necessary to consider questions more traditionally associated with other disciplines related to education.

In the second respect, the breadth and importance of this phenomenon make it impossible to address every possible assumption held by any possible stakeholder—or even to address a single assumption held by a single stakeholder at the level of detail it deserves. I have chosen four broad categories of assumptions that stood out to me as I wrote this chapter, but I am confident many other such categories merit our attention. I begin my description of each category with an example of unethical collection and use of data before describing how stakeholders justified it by underlying assumptions and other assumptions that may also justify the collection and use of data. After addressing each category, I provide an extended example of how identifying and questioning assumptions associated with these categories can inform additional ethical reflection related to educational data. Although an extended example still cannot address all of the ways my central thesis may apply to practice, it will serve as a model for applying these considerations.

What is the Purpose of Education?

Between August 2014 and June 2016, an officer of the Brigham Young University Police Department regularly accessed data from Utah law enforcement agencies to conduct surveillance on students of the private, religious university (Miller, 2019). This access—which

nearly led to the Utah Department of Public Safety decertifying BYU Police (Miller, 2021)—was "part of a de facto system, with university employees in several school departments asking him for information and welcoming his reports" (Miller & Alberty, 2021, para. 9). In one case, the data retrieved by BYU Police was used by the associate dean of students (since promoted to dean of students) to ask a woman detailed questions about a sexual assault that she had reported to city—not university—police. The associate dean questioned whether the woman was responsible for the assault and eventually told her she "wasn't welcome to sign up for classes again" (Miller & Alberty, 2021, para. 42).

Understanding assumptions about the purpose of education at BYU lends insight into how such an invasive and degrading use of data could be seen by educators as justified. Like other religious universities, BYU has been keenly aware of tensions between its academic goals and religious convictions throughout its history (Simpson, 2016). In the 1960s, the then-president of the university established a strict student code of conduct (known as the Honor Code) intended to ensure that students met not just academic standards but moral ones, suggesting that the latter were more important for this educational institution (Waterman & Kagel, 1998). Indeed, the previously-described use of police data to press a BYU student about her sexual assault was part of Honor Code-related concerns (Miller & Alberty, 2021); if—as the associate dean appears to have believed—the sexual contact were, in fact consensual, university rules would allow the student to be disciplined independent of academic performance. Thus, this aggressive surveillance of students was influenced by (though not necessarily an inevitable result of) a particular understanding of the purpose of education at this institution.

Less extreme examples also demonstrate the ways in which assumptions about the purpose of education drive the collection and use of data in educational contexts. Speaking broadly, our expectations about what schools, teachers, students, and others should accomplish necessarily inform what data we collect and how we use it. This is largely obvious and often justified; however, because these expectations do not provide any incentives to limit the scope or intensity of such collection and use, even good intentions can inspire ultimately unethical data collection and analysis. Thus, Crooks (2019) describes the definition and measurement of educational outcomes as a driving factor behind "the proliferation of surveillance" (p. 486) in schools. Even when assumptions about the purpose of education are sound, they must be weighed against other ethical considerations instead of used as the sole justification for decisions about data.

However, it is rare that our assumptions about the purpose of education do not merit further scrutiny. Consider, for example, something as seemingly benign as the content areas emphasized in formal curricula, which obviously affect how educational data are collected and how educational technologies are developed and employed. For example, world language education was once considered important enough that standardized testing in New York in the early 20th century included assessments of students' understanding of French, Spanish, and German; in turn, the importance of these data collection mechanisms led to inquiries about whether machines could be developed to score the assessments automatically (Watters, 2021). Likewise, transactions on the modern educational marketplace platform TeachersPayTeachers are dominated by materials related to English Language Arts and Math, reflecting the importance of these subjects in the U.S. Common Core State Standards and related assessments (Shelton et al., 2021). In contrast, because

the *baccalauréat* (a French assessment of secondary students) emphasizes philosophy, a tweet sharing philosophy notes to a hashtag related to the 2018 baccalauréat exams received over 23,000 retweets (Greenhalgh, Nnagboro, et al., 2021).

The need for further scrutiny in these examples is not because any of these content areas is unworthy of attention. However, even deeper assumptions about the purpose of education may be present in the emphasis on particular content areas. For example, while mathematics and literacy are undeniably important, Smith and Greenhalgh (2017) contrasted a Deweyan focus on the democratic aims of education with the Common Core State Standards' implicit suggestion that "the primary purpose of education is utilitarian: Students should master the standards so that they are positioned to achieve greater economic success in knowledge-based work" (p. 115). The tension between these two visions of the purpose of education is not new. In the throes of post-Sputnik concerns about education, Dewey's contemporaries criticized his influence on schools, which they suggested were ill-prepared to help the United States compete scientifically with the Soviet Union—another assumption about the purpose of education (Watters, 2021; see also Nichols, 2021).

This is particularly important because an emphasis on certain purposes of education necessarily de-emphasizes others, shaping data collection and use accordingly. Bradbury (2019) describes how an increased emphasis on mathematics and literacy in English early childhood education has drastically increased data collection about young children in England, creating tensions between teachers' obligation to collect data and their ability to build relationships or provide a more holistic education. In contrast, schools across the Channel in France do not collect data related to race and ethnicity because they stand in tension with French ideals of a color-blind Republic (Raveaud, 2008; Simon, 2015). The deliberate decision not to collect this data implicitly de-emphasizes the importance of racial or ethnic educational equity; Cuban (2003) provides a brief U.S. example of this danger, and Watters (2021) makes a similar observation that narratives about educational progress (or the lack thereof) tend to sidestep questions of race. However, the decision to collect data about such disparities is not itself the solution to them: D'Ignazio and Klein (2020) suggest that despite the potential of data to address issues of social justice, even well-intentioned collection of such data can do harm in propping up deficit narratives that "reduce a group or culture to its 'problems,' rather than portraying it with the strengths, creativity, and agency that people from those cultures possess" (p. 58). Indeed, Au (2016) applies this criticism to standardized testing regimes in the United States, arguing that although they are cloaked in superficially anti-racist arguments, they actually exacerbate structural racism by assuming their own objectivity and thereby providing an empirical basis for the argument that "low test scores and the educational failure of working class, children of color is due to their own deficiencies" (p. 46).

One important concern about modern educational technology platforms is that their design and use of data may stand in tension with long-standing Western values of public education, "such as *Bildung*—the ideal to teach children to become not just skilled workers but knowledgeable citizens—and equality" (van Dijck et al., 2018, p. 117). As important as this concern is, it is based on the understanding that these values are indeed held within the broader educational system. The previous paragraphs have demonstrated that other assumptions about the purposes of education are alive and well in the U.S. and other contexts, and this only exacerbates van Dijck and colleagues' concern that assumptions

about data and technology determine education values rather than the other way around. For example, Bradbury (2019) speculates that it is in part because it is relatively easy to collect data about mathematics and literacy that these content areas have received so much attention in England—that is, the perceived necessity of data is driving the purposes of education rather than the other way around. Likewise, Corrin and colleagues (2019) note that more adaptive learning platforms are developed for the STEM disciplines (partly because of their relatively well-structured nature) than for other content areas. Therefore, a decision to value adapted and personalized learning may lead to the preference of certain disciplines over others, for knee-jerk practical rather than thoroughly considered philosophical reasons.

What is the Purpose of Educational Technology?

In April 2019, an article in Kentucky's *Lexington Herald-Leader* described how social media monitoring efforts by Fayette County Public Schools (FCPS) helped the district intervene with two students needing help. (Spears, 2019). While the stories celebrated in the article are undeniably positive developments, they also raise questions about the scope and effectiveness of this surveillance. These two interventions were the result of a third-party company's review of over 60,000 social media posts, which flagged 60 posts subjected to further scrutiny by "a team that included mental health and law enforcement staff" (Spears, 2019, para. 1). In short, only one of every 30,000 posts subjected to surveillance warranted intervention. This situation raises questions about the costs to privacy imposed on other people—although the company exclusively surveilled public posts, many internet users "operate in public spaces but maintain strong perceptions or expectations of privacy" (Markham & Buchanan, 2012, p. 6; see also Fiesler & Proferes, 2018; Gilbert et al., 2021). Furthermore, the article mentions (almost as an aside) that one of the two people who received help was no longer an FCPS student but was attending college outside of Kentucky; how far did the scope of this surveillance reach in the name of helping local students?

A particular understanding of the purposes of educational technology drives this surveillance. As reported in the article, the monitoring efforts were part of a broader response to safety concerns over the previous academic year. However, this does not dismiss concerns voiced by the Electronic Frontier Foundation (among others) that "a growing number of schools across the country [are] conducting mass privacy violations of kids in the name of 'safety'" (Wang & Gebhart, 2020, para. 1). Indeed, the social media monitoring contracted by FCPS is not dissimilar to efforts by other companies to use social media data to surveil Black Lives Matter protests in cooperation with law enforcement agencies (e.g., Biddle, 2020).

Although this example compellingly demonstrates how assumptions about the purpose of educational technology shape data collection and use, it may also invite an objection that should be addressed before discussing this subject further. Watters (2018) noted that proponents of *educational technology* are unlikely to see safety-oriented technologies like metal detectors, school shooting simulators, and social media surveillance software as

falling under this category. Instead, educational technology's purpose is understood to be to advance (or even revolutionize) teaching and learning. Technologies like social media surveillance software are dismissed as irrelevant to our field because they do not fit neatly into this narrative. Nevertheless, persistent concerns about whether educational technologies achieve this purpose call into question the appropriateness of this assumption; research over the years has repeatedly questioned whether advancements in technology have fundamentally changed the ways teaching and learning happen (e.g., Cuban, 2003; Crooks, 2019). Indeed, the same logic also applies to less-obvious educational technologies: The 2022 school shooting in Uvalde, Texas, has invited scrutiny about whether school safety technologies work in the first place, raising the possibility that they merely serve as expensive "security theater" (e.g., Faife, 2022; Gordon & Rose, 2022; Rose, 2022). If stakeholders' assumptions about educational technology's purpose—and success—are invalid, this obviously raises questions about whether the collection and analysis of data about students and other stakeholders are justified.

Yet, even when these assumptions are valid, they risk validating the use of educational technologies without considering data ethics and justice. To illustrate this point, consider Cuban's (1986) examination of film, radio, and television as educational technologies. Each was held to have considerable promise and was introduced with fanfare, only to largely go unused (see Molenda, 2008, for a similar discussion). Cuban (2003) later suggested that personal computers followed a similar pattern. However, contemporary educational technologies differ from their predecessors in at least two respects. First, although data collection has long been a feature of educational technologies (see Watters, 2021), contemporary technologies allow for collecting more kinds of data at greater volumes (Corrin et al., 2019; Mandinach & Gummer, 2021b). Second, if previous generations of educational technology ended up going largely unused, contemporary educational technologies are pervasive. For example, the COVID-19 pandemic has required the use of educational technology at a scale never before seen; this not only increases the importance of validating claims and assumptions about technologies (Reeves & Lin, 2020) but also exposes students to more surveillance than ever before (Hankerson et al., 2021).

The combination of these two differences suggests that data collection and use in educational contexts exist at a greater scale than ever before. Put simply, contemporary educational technologies may allow for the continuing collection of data about students rather than targeted and constrained efforts (Beardsley et al., 2019). Because students and other stakeholders' "sharing of personal data carries with it risks." (Beardsley et al., 2019, p. 1019), this scale of sharing—which is more often compelled than volunteered—increases the scale of associated risks (e.g., the virtual impossibility of anonymizing data; Drachsler & Greller, 2016). This is especially so given that advancements in data collection often outpace the development of legal and ethical frameworks for data collection (Corrin et al., 2019). Furthermore, while it is true that some of these "increasing risks" are related to "inadvertent and innocent misuses of data" (Mandinach and Gummer, 2021b, p. viii), it would be unwise to ignore risks associated with bad (or at least self-interested) actors. Consider the example of a graduate program that encourages or requires its students to engage with each other and their instructors on Twitter. While this could serve genuinely important learning purposes (Greenhalgh et al., 2016), there is no denying that such a requirement supports social media platforms' use of digital labor, "in which value is created from the unpaid action

of online audiences" (Selwyn, 2019, p. 53; see also D'Ignazio & Klein, 2020; Drachsler & Greller, 2016; Krutka et al., 2019).

Thus, the risk in adopting contemporary technologies in the hope of improving education is no longer just that today's optimism may one day look "just as silly to people 50 years from now" as past hyperbolic promises look to us today (Mishra et al., 2009, p. 49). Rather, even if today's optimism is warranted, it may come at an ethical cost that is not. This realization must lead us to interrogate the purposes we assign to educational technology and weigh them against the costs imposed by contemporary technologies. Adopting technology may indeed lead to improvements in teaching and learning; however, we must also consider the possibilities that—and perils if—stakeholders merely "use the rhetoric of technological progress to establish legitimacy" (Cuban, 2003, p. 159). Student accountability is important, but we must also consider how learning management systems (LMSs) allow us to monitor students in invasive ways that would be unimaginable in a face-to-face context. Building on an example from Eaton (2021), it would be absurd and unacceptable for a university instructor to sit in their student's dorm room, looking over their shoulder and timing how long they spend reading each page in their textbook. Yet, this is a commonly included and widely valued feature of LMSs. Student safety must be a priority, but are there initiatives other than social media surveillance (led by stakeholders other than education professionals) to ensure that guns aren't brought into the classroom? Whatever the technology and whatever its purpose, we must consider "ethical and privacy values on the same level as functional requirements" (Drachsler & Greller, 2016, p. 8).

What Determines Quality in Educational (Technology) Research?

During the Fall 2021 semester, IT and facilities units at George Washington (GW) University began researching how community members used campus buildings. While this could conceivably be measured in many ways, GW employees chose to use "locational data from… WiFi access points across GW campuses" (Wrighton, 2022, para. 2). Because many students' devices were registered with the university to access WiFi, employees saw an opportunity for examining building use data through various demographic lenses; this locational data was therefore combined with "additional de-identified student data" (para. 2). In February 2022, the new president of the university (who had only assumed that role a month before) apologized to the university population that they had not been informed of the research ahead of time; in doing so, he acknowledged that the technical infrastructure used for this project could potentially have tracked members of the campus community on an individual basis (Beals, 2022).

This threat to individuals' privacy results from overly narrow assumptions about what determines quality in research. Research in education contexts can be understood as "a form of humanistic inquiry grounded in argument from evidence" (Penuel & Frank, 2016, p. 16), so it is clear that *some good data are necessary* for quality research. Even the quality of a "conceptual" chapter like this one depends on its ability to build on and correspond with

empirical observations. Nonetheless, a legitimate empirical commitment can sometimes be narrowed into a more problematic assumption that *all data is necessarily good* and that the use of empirical data is the sole determining measure of research quality. It is undeniable that the research project described above needed some data, and the data were indeed both readily available and well-suited to answer the question; yet, as Heath (2021) writes, the "mere availability of data does not confer ethical collection of data" (p. 334).

It is important to acknowledge that it is normal for researchers to consider new forms of data as part of their commitment to empiricism and quality research. Throughout the history of research, data has typically required considerable effort to collect (boyd & Crawford, 2012). Therefore, we should not be surprised that educational technology scholars have been eager to explore new data sources (Rosenberg et al., 2021). Indeed, technologies such as the internet (Kimmons & Veletisanos, 2018), social media platforms (Greenhalgh et al., 2021), and learning management systems "generate user data untiringly" (Romero-Hall et al., 2021, p. 216), drastically simplifying data collection and leading to the application of new methodologies designed to take advantage of large amounts of data (e.g., Baker & Siemens, 2014; Jin, 2021; Rosenberg et al., 2021).

These new methods and methodologies build admirably on our field's commitment to empiricism—however, they risk adopting other assumptions that may misshape our understanding of quality research. For example, while it is true that a major obstacle to properly using these methods is an absence of corresponding technical training (Kimmons & Veletsianos, 2018), it is critical to note that lack of opportunity does not affect all populations equally. For example, D'Ignazio and Klein (2020) argue that expertise in data science (among other fields) is often formally defined in terms of credentials, affiliations, or technical training that men are more likely to have access to—despite the fact that self-taught women helped lay the foundation for the field to begin with. Thus, the use of these methodologies in education contexts will only be inclusive if training and membership in these communities are also inclusive (Rosenberg et al., 2021). Given the dominance of masculine perspectives in educational technology independent of these methods (e.g., Romero-Hall, 2022), these necessary course corrections may require considerable effort. However, failure to do so risks the perpetuation of data-rich projects in education that are "characterized by masculinist, totalizing fantasies of world domination as enacted through data capture and analysis" (D'Ignazio & Klein, 2020, p. 151).

Other troubling assumptions about quality research stem from the association of the eugenics movement with quantitative research and its application in education. Several early pioneers of statistical analysis were eugenicists (Saltz & Stanton, 2018), and it is impossible to separate widely-accepted ideas such as correlation (Shaffer, 2017) and data cleaning (D'Ignazio & Klein, 2020) from their development in and for projects underpinned by racist and social Darwinist assumptions. This troubled history does not necessarily invalidate data-rich or any other quantitative research. However, it does underline the importance of critically reflecting on associated assumptions to determine where they might stand in tension with important ethical commitments. This is particularly true in the context of educational research, where eugenicist ideas played a role in the development of educational psychology constructs such as IQ and in assessment instruments such as standardized tests, which were hoped by some to compellingly shore up White intellectual supremacy (Au, 2016; Kendi, 2017).

It must also not be assumed that data-rich research is necessarily quality research. While this might seem obvious, such an assumption is implicit in much of the discourse about these methods. Indeed, D'Ignazio and Klein (2020) argue that the 17th-century coining of the term *data* was itself a rhetorical flourish meant to convey trustworthiness: "Identifying information as data… converted otherwise debatable information into the solid basis for subsequent claims" (p. 10). This rhetorical force arguably extends to the term *data science* and its application in educational contexts. If the constituent parts of this term are taken literally, it is difficult (if not impossible) to identify a science that does not employ data (D'Ignazio & Klein, 2020; Shaffer, 2017)—why, then, do *these* methodologies deserve this label and its glowing reputation? One strong candidate for setting apart data science and associated methodologies is their ability to consider large data sets; however, Saltz and Stanton (2018) problematize the novelty of this distinction as well, returning us to the original concern. Furthermore, many also assume big data to be inherently high-quality—to the extent that boyd and Crawford (2012) argue that the phenomenon is defined in part by a mythology of "truth, objectivity, and accuracy" (p. 663). While it is true that large datasets can often be helpful, it is equally true that some "projects ignore context, fetishize size, and inflate their technical and scientific capabilities" (D'Ignazio & Klein, 2020, p. 151).

The key to deflating erroneous assumptions about big data—and holding appropriate assumptions about the importance of empiricism in check—is to emphasize that data are inherently non-objective. While some stakeholders may tacitly acknowledge this, there is reason to believe that the objectivity of data is the prevailing assumption in our discipline. Consider, for example, the authority that educational technology stakeholders lend to LMS data: Corrin and colleagues (2019) note that students may instinctively trust—rather than interrogate—learning analytics that have institutional approval, and the Electronic Frontier Foundation points to teachers and institutions using data for purposes that LMS developers have not intended or endorsed (Budington, 2021). Indeed, quantitative techniques and quantified data are particularly likely to be seen as (more) objective and, therefore, of higher quality, despite many debates among educational technology stakeholders on this subject over the years (e.g., Boekweg et al., 2021; Romero-Hall, 2021). In contrast, Shaffer (2017) suggests that quantitative modeling may require more scrutiny than qualitative research—not because it is inherently inferior but because it is more often the basis for decisions. Such scrutiny is based on the understanding that despite countless assertions to the contrary, "data cannot speak for themselves, so they must be made to speak" (Crooks, 2019, p. 485; see also boyd & Crawford, 2012). Campos and colleagues (2021) describe how teachers' making sense of LMS data is influenced by individuals' emotions, analyses, and intentions—not to mention collective, organizational, and institutional factors. On a similar note, Crooks (2019) describes how school administrators made a sudden shift in their interpretation of standardized testing data in response to labor disputes at the school: "the relevant data did not change, rather what these data were allowed to represent changed and did so rather abruptly" (p. 492).

Beyond a general and foundational non-objectivity, we must also consider the constraints and limitations of the technologies we use to provide these novel data. The design and governance of social media platforms influence which platforms researchers collect data from (Tufecki, 2014) and what phenomena they study on the platform (boyd & Crawford, 2012). Some kinds of data are easier to collect through LMSs than others (Corrin et al., 2019), and Jin (2021) raises the possibility that available LMS data may not perfectly align

with the theoretical constructs researchers are investigating. Furthermore, digital data "dynamically order and reorder the world" (Crooks, 2019, p. 495) rather than merely capture reality. Facebook (or Twitter) data neatly quantify likability for internal—and scholarly—consideration, but van Dijck (2013) problematizes the validity of those measures, drawing particular attention to how corporate values shape platforms' understanding of these constructs. Learning Management Systems offer massive amounts of data about student activity, but by privileging quantitative and categorical data and presenting them in carefully arranged and neatly structured formats, they may "undermine and erase" the messy complexity that defines "humans and learning" (Eaton, 2021, para. 9). These limitations may not challenge our assumptions about the importance of data for quality research, but they should invite consideration about what data we assume to be of sufficient quality.

Who Has What Say in These Domains?

For over 20 years, the Pasco County Sheriff's Office in Florida accessed data collected by county schools and combined the data with records from other public agencies to produce "a secret list of kids it thinks could 'fall into a life of crime'" (Bedi & McGrory, 2020, para. 1). This collection and use of data is based on several dubious assumptions, including that one purpose of educational data is to engage in predictive policing and that school grades are an objective measure of intelligence. However, I include the story in this section to draw attention to two other controversial aspects which led to the dismantling of the program six months later (Associated Press, 2021): first, the sharing of educational data with a law enforcement agency, a move which experts described as "highly unusual" (Bedi & McGrory, 2020, para. 12); second, the fact that students and other stakeholders had no say in—because they were not informed of—the development and use of this list.

This kind of data misuse is based on assumptions about who has what say in education, educational technology, and research in these contexts. Throughout this chapter, I have referred generally to "educational technology stakeholders" without specifically considering who these stakeholders are or should be. The purpose of this section is to underline the importance of these questions, although (as with previous sections) I stop short of trying to answer them. While these questions could be considered in many ways, I focus particularly on how they relate to our use of data. Comparing digital data to oil has become somewhat of a cliché in the popular discourse because both have had a revolutionary impact on the world. However, D'Ignazio and Klein (2020) note that this metaphor draws (perhaps unintended) attention to how the changes brought about by data are not always for the better. Not only are the "power and profit" associated with data distributed unevenly (i.e., with data barons succeeding oil barons), but the metaphor also "helps highlight the exploitative dimensions of extracting data from their source—people—as well as their ecological cost" (p. 45). Different stakeholders may have conflicting, equally legitimate perspectives (and corresponding ethical interpretations; Corrin et al., 2019), so care must be taken to ensure the just treatment of all stakeholders.

Indeed, Slade and Prinsloo (2013) argue that the ethical application of learning analytics depends on benefiting all parties. Learning analytics is usually (perhaps even always)

deployed under the assumption that all parties will benefit, but careful consideration is important. For example, one application of learning analytics allows instructors and institutions to intervene when a model predicts that a student may be about to drop a course or leave a university (Corrin et al., 2019). While intended to benefit students, U.S. institutions of higher education may also have self-serving reasons for wanting to prevent attrition, including retaining tuition dollars and improving performance metrics—are there cases where institutions' priorities stand in tension with students'? Moreover, if so, whose priorities do learning analytics serve? Corrin and colleagues (2019) also draw attention to ways other stakeholders might benefit from student data that raise ethical tensions: Professors may use the data to advance their research careers, and educational technology companies may use it to improve their products. This latter point is particularly important given that products "offered by commercial vendors obviously come at a cost" even though their effectiveness has not yet been proven (p. 16). Going further, Eaton (2021) asks why Learning Management Systems collect fine-grained student data (such as time spent taking a quiz) for instructors and institutions but not fine-grained instructor and institution data (such as time spent grading a quiz) for students; there are no technical obstacles to sharing the data both ways, revealing the role of underlying assumptions about the relative importance of various parties. Indeed, Doyle (2021)—writing from a student perspective—notes that she and her peers do not always have a choice to resist data collection they object to on privacy grounds.

On a similar note, it is important to understand the way that the act of data collection shifts agency from some stakeholders to others. High-level stakeholders have always used data to shape educational policy (Nichols, 2021), and digital data and associated tools are playing a growing role in shaping how teaching and learning happen (Williamson 2016a, 2016b). To a certain extent, this is necessary and good, but data collection can also be motivated by an implicit distrust of teachers and a corresponding shift of agency and power to other stakeholders. This was true of the push for curriculum standards and corresponding testing in the U.S. in the early 20th century (Watters, 2021) and has continued through the push for so-called accountability in U.S. federal policy, which Nichols (2021) describes as "a *specific mandate* for how achievement data should be used [that] has had deleterious effects on teacher practices and student outcomes" (p. 82). "Educators are literally drowning in data" (Mandinach & Gummer, 2021b, p. viii), and in some cases, their professionalism is defined in terms of their ability to produce data so that others may evaluate outcomes (Bradbury, 2019; see also Eaton, 2021) rather than their ability to evaluate outcomes on their own.

We must also consider who has what say in educational (technology) research. These considerations can become highly complex in internet and social media research (e.g., Greenhalgh, Koehler, et al., 2021; Kimmons & Veletsianos, 2018). For example, the public nature of these data means that research of this type in educational technology and other disciplines is often not subject to ethical review, creating obvious opportunities for misuse. However, there is little consensus among professionals engaged in ethical review about what that process should look like for this kind of research (Vitak et al., 2017), and failure to understand "the distinctive characteristics of internet research" (franzke et al., 2019, p. 13) may lead to overly conservative approaches to ethical review. Likewise, informed consent is typically not required when research data is public. Because participants have expressed general discomfort with the possibility of researchers' collecting and analyzing their social media data (Fiesler & Proferes, 2018; Gilbert et al., 2021), educational technology

researchers should consider whether and how it would be appropriate to obtain participants' consent (Proferes and Walker [2020] discuss these considerations at length).

Nevertheless, there may be cases where it would be more appropriate not to obtain consent. For example, teachers sympathetic to the far right (see Greenhalgh et al., 2021) may be unlikely to permit researchers (who are often perceived as left-wing) to study their public social media posts. The role of private social media companies must also be considered here; these companies are under no obligation to share their data with researchers (boyd & Crawford, 2012) and may use Terms of Service agreements and other policies to restrict researchers from collecting data from their platforms. Although researchers should not violate these policies willy-nilly, there may be cases where ethical research requires their violation (Fiesler et al., 2020); for example, if an influential online educational marketplace forbade automated data collection, its very influence might nonetheless justify such a collection in the name of scholarly scrutiny (e.g., Aguilar et al., 2022; Shelton et al., 2021).

Of course, ensuring that the appropriate stakeholders have a say in how data are used in educational contexts depends on their awareness of how data—and associated technologies—are being used. Traditional, perfunctory approaches to obtaining consent for data collection are often insufficient, especially when people are not fully aware of the risks associated with that consent (Beardsley et al., 2019, p. 1031). Modern data platforms are often highly complex, making it difficult for users to understand what that collection and use look like (Drachsler & Greller, 2016; Proferes, 2017). Thus, Corrin and colleagues (2019) emphasize that stakeholders cannot truly consent to the collection and use of data unless those leading the collection are "open and transparent" about how they do so (p. 10).

Questioning Assumptions and Ethical Reflection: An Extended Example

In this final section, I provide an extended example of how identifying and questioning assumptions associated with the categories above can inform additional ethical reflection when making decisions related to educational data. This example is necessarily narrow in scope; as I have previously argued, it is impossible to address every possible implication of all possible assumptions held by any possible stakeholder—or even to address in appropriate detail a single implication of a single assumption held by a single stakeholder. Furthermore, I have deliberately decided to focus this entire section on a single hypothetical decision by a single hypothetical stakeholder; while this allows me to demonstrate how a single decision may be influenced differently by different assumptions, it also further limits the scope of this example.

More specifically, I consider a hypothetical scenario in which an American high school French teacher is considering adopting the ClassDojo app in their classroom. This app has many features, but this teacher is specifically considering its use for behavior management. They are relatively new at their job and are facing obstacles related to disruptive classroom behavior, so they are interested in the app's ability to measure classroom behavior by

awarding and deducting points to and from students. This teacher knows that ClassDojo has long been controversial—especially regarding data privacy (e.g., Singer, 2014; Williamson, 2017)—and understands that this decision has ethical dimensions. However, while they take for granted that there are ethical costs to collecting data on their students through ClassDojo, they are open to the possibility that the value of the data collected through ClassDojo could potentially outweigh the costs of privacy violations. In the following sections, I revisit each category of assumptions described above to demonstrate how interrogating these assumptions might affect this teacher's ethical reflection.

What is the Purpose of Education?

In reflecting on whether or not to use ClassDojo, this French teacher asks how important behavior management is among all their professional responsibilities. They are genuinely frustrated by the disruptive behavior in their classroom, and ClassDojo offers a potential solution to this problem. However, this teacher believes that an important purpose of their job is to prepare their high school students to become adult citizens in a democratic society, and they desperately hope that adults' behavior is based on prosocial commitment rather than a gamified point count. The ethical cost of ClassDojo data collection seems higher when the app's design stands in tension with this professional commitment. In contrast, however, this teacher is also committed to establishing an immersion classroom where they and their students only speak French for long periods. They know from their experience as a French student that their students will struggle with this, and they have fond memories of classes they took where students tried to go as long as possible without getting "strikes" for speaking English. ClassDojo might support this particular purpose of the French classroom enough to outweigh ethical concerns.

What is the Purpose of Educational Technology?

In continuing their consideration, this teacher also asks what the role of educational technology in their classroom is. Like many teachers-in-training, they learned that educational technology is only worth adopting when it distinctly enhances teaching or improves learning. Thinking back to the "strike system" in some of the immersive French classes they took, they feel confident that the system helped them break the habit of resorting to English instead of pushing the limits of their French. The French teacher considers that ClassDojo might be useful for the same purpose. After all, if the purpose of educational technology is to improve learning, and if ClassDojo could improve learning, that might be enough to dismiss ethical concerns about the app's data collection. However, it also occurs to them that the teachers and professors who issued strikes never used an app, instead keeping tallies in a notebook or on a whiteboard. This changes the calculation: If a notebook or whiteboard improves learning in the same way (the assumed measure of success of any educational technology) but without the cost to student privacy, they concede that it must be the better option from an ethical point of view.

What Determines Quality in Educational (Technology) Research?

This teacher then continues their reflection by asking whether the data provided by ClassDojo is the kind of data they seek. Although their assumptions about the purpose of their teaching stand in tension with using ClassDojo as a behavior management tool, this—understandably!—has not entirely dismissed their frustration about their students' disruptive behavior. Quantifying students' behavior and communicating those quantifications to parents is an attractive possibility. However, to do so involves figuring out which behaviors merit the awarding of a point and which merit the deducting of a point—and this proves harder than expected for the French teacher. They are unsure they can determine which behaviors are equal in point value and not confident that they would be perfectly consistent across students (including across races, genders, and other demographic categories) in awarding and deducting those points. A point value seems like a simple, objective measure of behavior, but some students bother this teacher more than others. When pressed, they can't defend their initial assumption that ClassDojo points would be a quality, consistent measure of behavior.

Who Has What Say in These Domains?

The French teacher is making this decision about ClassDojo independently, but they must still navigate assumptions about who gets what say in this decision. For example, this teacher's concerns about the app (on data privacy grounds) implies a resistance to the ClassDojo company's assumption that they have a right to collect—and presumably, analyze—data about students in exchange for providing services to classrooms. The teacher may also have to consider whether their advanced students would prefer using an app than a whiteboard or a notebook to manage the "strike system" for not speaking English in class. They may be more likely to adopt the app if they assume that students have a right to determine the educational technologies they use—and are mature enough to consider some of the ethical risks involved. Conversely, if they assumed they had the sole right or responsibility to determine which technologies are used in their classroom, their students' feelings about ClassDojo would become less relevant to this ethical decision. On a related note, it is possible that their school—or a local, regional, or national educational or legislative body—would make the decision about ClassDojo for them, either mandating or forbidding its use based on the assumption that they better understand the benefits and risks involved.

Conclusion

Throughout this chapter, I have demonstrated how our assumptions about education, educational technology, research, and stakeholders in these pursuits shape our collection and use of data. It follows, therefore, that questions of ethics and justice as they apply to data are not limited to the data themselves. Rather, data misuse can be motivated by deeper assumptions, and debates about data ethics are often better understood as debates about deeper issues. Further complicating this issue, few of the assumptions that I have

considered in this chapter are inherently wrong: From my perspective, at least, developing mastery of mathematics and literacy *is* an important part of education, technology *does* sometimes improve the processes of learning and teaching, collecting data *is* a necessary part of research, and policymakers *can* use data to improve educational systems. However, the collection and use of data are often justified on the basis of these assumptions alone, without critically examining them or holding them in tension with other guiding beliefs. For example, we would benefit from asking what other content areas are important, what other technologies are used in educational settings, what kinds of data are valued in education research, and what limits should be placed on policymakers' influence in the classroom. Likewise, even after critical examination, all of these assumptions must stand alongside—rather than override—assumptions about stakeholders' dignity, agency, and privacy.

Many of these considerations are typically seen as outside the realm of educational technology, but they are not less important for that. I do not wish to dismiss the expertise built up within the more traditional boundaries of our discipline, nor would I dare suggest that we do not need to consult stakeholders in other disciplines who are more used to thinking these questions through. Nonetheless, just as the ethical and just use of data in educational technology contexts is not merely about data, it must not be informed only by established and uncontested ideas within our field. Indeed, over 35 years ago, Mason (1986) described four fundamental "ethical issues of the information age" that overlap considerably with many of the considerations I have described here. These issues have only become more pressing in the decades since, and if we have not fully grappled with them, it is perhaps because we have been overly narrow in our concerns. To ensure the ethical use of data in educational technology, we must be willing to explore widely and dig deep.

References

Aguilar, S. J., Silver, D., & Polikoff, M. S. (2022). Analyzing 500,000 TeachersPayTeachers.com lesson descriptions shows focus on K-5 and lack of Common Core alignment. *Computers and Education Open, 3*, 100081. https://doi.org/10.1016/j.caeo.2022.100081

Associated Press. (2021, May 4). Sheriff, school board revise plan to access student data. *AP News.* https://apnews.com/article/school-boards-education-073cd70e4d0e7988207a618c12ae0851

Au, W. (2016). Meritocracy 2.0: High-stakes, standardized testing as a racial project of neoliberal multiculturalism. *Educational Policy, 30*(1), 39–62. https://doi.org/10.1177/0895904815614916

Baker, R., & Siemens, G. (2014). Educational data mining and learning analytics. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed.; pp. 253–272). Cambridge University Press.

Beals, M. (2022, February 14). George Washington University apologizes for tracking locations of students, faculty. *The Hill*. https://thehill.com/homenews/state-watch/594142-george-washington-university-apologizes-for-tracking-locations-of

Beardsley, M., Santos, P., Hernández-Leo, D., & Michos, K. (2019). Ethics in educational technology research: Informing participants on data sharing risks. *British Journal of Educational Technology, 50*(3), 1019–1034. https://doi.org/10.1111/bjet.12781

Bedi, N., & McGrory, K. (2020, November 19). Pasco's sheriff uses grades and abuse histories to label schoolchildren potential criminals: The kids and their parents don't know. *Tampa Bay Times*. https://projects.tampabay.com/projects/2020/investigations/police-pasco-sheriff-targeted/school-data/

Biddle, S. (2020, July 9). Police surveilled George Floyd protests with help from Twitter-affiliated startup Dataminr. *The Intercept*. https://theintercept.com/2020/07/09/twitter-dataminr-police-spy-surveillance-black-lives-matter-protests/

Boekweg, A., Call, H., Craw, D., Jennings, F., Irvine, J., & Kimmons, R. (2021). Educational technology: A history of research trends from 1970 to 2020. In R. Kimmons & J. Irvine (Eds.), *50 years of education research trends*. https://edtechbooks.org/50_years

boyd, d., & Crawford, K. (2012). Critical questions for big data. *Information, Communication & Society, 15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Bradbury, A. (2019). Datafied at four: The role of data in the 'schoolification' of early childhood education in England. *Learning, Media and Technology, 44*(1). https://doi.org/10.1080/17439884.2018.1511577

Budington, B. (2021, August 9). The company behind online learning platform Canvas should commit to transparency, due process for students. *Electronic Frontier Foundation Deeplinks Blog*. https://www.eff.org/deeplinks/2021/08/company-behind-online-learning-platform-canvas-should-commit-transparency-due

Campos, F. C., Ahn, J., DiGiacomo, D. K., Nguyen, H., & Hays, M. (2021). Making sense of sensemaking: Understanding how K-12 teachers and coaches react to visual analytics. *Journal of Learning Analytics, 8*(3), 60–80. https://doi.org/10.18608/jla.2021.7113

Corrin, L., Kennedy, G., French, S., Shum, S. B., Kitto, K., Pardo, A., West, D., Mirriahi, N., & Colvin, C. (2019). *The ethics of learning analytics in Australian higher education: A discussion paper.* https://melbourne-cshe.unimelb.edu.au/research/research-projects/edutech/the-ethical-use-of-learning-analytics

Crooks, R. (2019). Cat-and-mouse games: Dataveillance and performativity in urban schools. *Surveillance and Society, 17*(3/4): 484–498. https://doi.org/10.24908/ss.v17i3/4.7098

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. Teachers College Press.

Cuban, L. (2003). *Oversold & underused: Computers in the classroom*. Harvard University Press.

D'Ignazio, C., & Klein, L. F. (2020). *Data feminism*. The MIT Press.

Donaldson, J. (2016). *Women's voices in the field of educational technology*. Springer. https://doi.org/10.1007/978-3-319-33452-3

Drachsler, H. (2016). Privacy and analytics—it's a DELICATE issue: A checklist for trusted learning analytics. In D. Gašević & G. Lynch (Chairs), LAK '16: Proceedings of the *Sixth International Conference on Learning Analytics & Knowledge* (pp. 89–98). https://doi.org/10.1145/2883851.2883893

Doyle, S. (2021). Why don't you trust us? *The Journal of Interactive Technology & Pedagogy,* 20. https://jitp.commons.gc.cuny.edu/why-dont-you-trust-us/

Eaton, L. (2021). The new LMS rule: Transparency working both ways. *The Journal of Interactive Technology & Pedagogy*, 20. https://jitp.commons.gc.cuny.edu/the-new-lms-rule-transparency-working-both-ways/

Faife, C. (2022, May 31). After Uvalde, social media monitoring apps struggle to justify surveillance. *The Verge*. https://www.theverge.com/2022/5/31/23148541/digital-surveillance-school-shootings-social-sentinel-uvalde

Franzke, A. S., Bechmann, A., Zimmer, M., & Ess, C., & the Association of Internet Researchers (2020). *Internet research: Ethical guidelines 3.0*. Retrieved from https://aoir.org/reports/ethics3.pdf

Fairclough, N. (1989). *Language and power*. Addison Wesley Longman Limited.

Fiesler, C., Beard, N., & Keegan, B. C. (2020). No robots, spiders, or scrapers: Legal and ethical regulation of data collection methods in social media terms of service. In M. De Choudhary., R. Chunara, A. Culotta, & B. Foucalt (Eds.), Proceedings of the *Fourteenth International AAAI Conference on Web and Social Media* (pp. 187–196). Association for the Advancement of Artificial Intelligence.

Fiesler, C., & Proferes, N. (2018). "Participant" perceptions of Twitter research ethics. *Social Media + Society, 4*(1). https://doi.org/10.1177/2056305118763366

Gilbert, S., Vitak, J., & Shilton, K. (2021). Measuring Americans' comfort with research uses of their social media data. *Social Media + Society, 7*(3). https://doi.org/10.1177/20563051211033824

Gordon, A., & Rose, J. (2022, August 25). "The least safe day": Rollout of gun-detecting AI scanners in schools has been a 'cluster,' emails show. *Motherboard*.

https://www.vice.com/en/article/5d3dw5/the-least-safe-day-rollout-of-gun-detecting-ai-scanners-in-schools-has-been-a-cluster-emails-show

Green, B. (2021). Data science as political action: Grounding data science in a politics of justice. *Journal of Social Computing, 2*(3), 249–265. https://doi.org/10.23919/JSC.2021.0029

Greenhalgh, S. P., Rosenberg, J. M., & Wolf, L. G. (2016). For all intents and purposes: Twitter as a foundational technology for teachers. *E-Learning and Digital Media, 13*(1-2), 81–98. https://doi.org/10.1177/2042753016672131

Greenhalgh, S. P., Koehler, M. J., Rosenberg, J. M., & Staudt Willet, K. B. (2021). Considerations for using social media data in learning design and technology research. In E. J. Romero-Hall (Ed.), *Research methods in learning design and technology* (pp. 64–77). Routledge.

Greenhalgh, S. P., Nnagboro, C., Kaufmann, R., & Gretter, S. (2021). Academic, social, and cultural learning in the French #bac2018 hashtag. *Educational Technology Research and Development, 69*(3), 1835–1851. https://doi.org/10.1007/s11423-021-10015-6

Greenhalgh, S. P., Krutka, D., & Oltmann, S. M. (2021). Gab, Parler, and (mis)educational technologies: Reconsidering informal learning on social media platforms. *Journal of Applied Instructional Design, 10*(3). https://doi.org/10.51869/103/sgdkso

Hankerson, D. L., Venzke, C., Laird, E., Grant-Chapman, H., & Thakur, D. (2021). Online and observed: Student privacy implications of school-issued devices and student activity monitoring software. *Center for Democracy & Technology*. https://cdt.org/insights/report-online-and-observed-student-privacy-implications-of-school-issued-devices-and-student-activity-monitoring-software/

Hakimi, L., Eynon, R., & Murphy, V. A. (2021). The ethics of using digital trace data in education: A thematic review of the research landscape. *Review of Educational Research, 91*(5), 671–717. https://doi.org/10.3102/00346543211020116

Heath, M. K. (2021). Buried treasure or ill-gotten spoils: The ethics of data mining and learning analytics in online instruction. *Educational Technology Research and Development, 69*, 331–334. https://doi.org/10.1007/s11423-020-09841-x

Jin, T. (2021). Learning analytics: The emerging research method for enhancing teaching and learning. In E. Romero-Hall (Ed.), *Research methods in learning design and technology* (pp. 192–205). New York, NY: Routledge.

Kendi, I. X. (2017). *Stamped from the beginning: The definitive history of racist ideas in America*. Bold Type Books.

Kimmons, R., & Veletsianos, G. (2018). Public internet data mining methods in instructional design, educational technology, and online learning research. *TechTrends, 62*, 492–500. https://doi.org/10.1007/s11528-018-0307-4

Krutka, D. G., Manca, S., Galvin, S. M., Greenhow, C., Koehler, M. J., & Askari, E. (2019). Teaching "against" social media: Confronting problems of profit in the curriculum. *Teachers College Record, 121*(14), 23046. https://doi.org/10.1177/016146811912101

Mandinach, E. B., & Gummer, E. S. (2021a). Data ethics: an introduction. In E. B. Mandinach & E. S. Gummer (Eds.), *The ethical use of data in education: Promoting responsible policies and practices* (pp. 1-32). WestEd.

Mandinach, E. B., & Gummer, E. S. (2021b). *The ethical use of data in education: Promoting responsible policies and practices*. WestEd.

Mason, R. O. (1986). Four ethical issues of the information age. *MIS Quarterly, 10*(1), 5–12.

Miller J. (2019, February 28). A lieutenant with BYU police shared private reports with university officials investigating students when he shouldn't have. And new info shows he did it for two years. *The Salt Lake Tribune*. https://www.sltrib.com/news/2019/02/28/lieutenant-with-byu/

Miller, J. (2021, January 5). BYU will keep its police department, after a judge dismisses Utah's decertification efforts. *The Salt Lake Tribune*. https://www.sltrib.com/news/2021/01/05/byu-will-keep-its-police/

Miller, J., & Alberty, E. (2021, December 16). Newly released records show it was 'standard practice' for BYU police to help with Honor Code surveillance. *The Salt Lake Tribune*. https://www.sltrib.com/news/2021/12/16/newly-released-records/

Mishra, P., Koehler, M. J., & Kereluik, K. (2009). The song remains the same: Looking back to the future of educational technology. *TechTrends, 53*(5), 48–53. https://doi.org/10.1007/s11528-009-0325-3

Molenda, M. (2008). Historical foundations. In: J. M., Spector, M. D., Merrill, J. van Merriënboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology* (3rd ed., pp. 3–20). Lawrence Erlbaum Associates.

Nichols, S. L. (2021). Educational policy contexts and the (un)ethical use of data. In E. B. Mandinach & E. S. Gummer (Eds.), *The ethical use of data in education: Promoting responsible policies and practices* (pp. 81–97). WestEd.

Penuel, W. R., & Frank, K. A. (2016). Modes of inquiry in educational psychology and learning sciences research. In L. Corno & E. M. Anderman (Eds.), *Handbook of educational psychology* (3rd ed., pp. 16–28). Routledge.

Proferes, N. (2017). Information flow solipsism in an exploratory study of beliefs about Twitter. *Social Media + Society, 3*(1). https://doi.org/10.1177/2056305117698493

Proferes, N., & Walker, S. (2020). Researcher views and practices around informing, getting consent, and sharing research outputs with social media users when using their public data. In Proceedings of the *53rd Annual Hawai'i International Conference on System Sciences*. IEEE Computer Society.

Raveaud, M. (2008). Culture-blind? Parental discourse on religion, ethnicity and secularism in the French educational context. *European Educational Research Journal, 7*(1), 74–88. https://doi.org/10.2304/eerj.2008.7.1.74

Reeves, T. C., & Lin, L. (2020). The research we have is not the research we need. *Educational Technology Research and Development, 68*, 1991–2001. https://doi.org/10.1007/s11423-020-09811-3

Romero-Hall, E. (2021). Research methods in learning design and technology: A historical perspective of the last 40 years. In E. Romero-Hall (Ed.), *Research methods in learning design and technology* (pp. 1–10). Routledge.

Romero-Hall, E. (2022). Navigating the instructional design field as an Afro-Latinx woman: A feminist autoethnography. *TechTrends, 66*, 39–46. https://doi.org/10.1007/s11528-021-00681-x

Romero-Hall, E., Correia, A. P., Branch, R. M., Cevik, Y. D., Dickson-Dean, C., Chen, B., Liu, J. C., Tang, H., Vasconcelos, L., Pallit, N., & Thankachan, B. (2021). Futurama: Learning design and technology research methods. In E. Romero-Hall (Ed.), *Research methods in learning design and technology* (pp. 206–226). Routledge.

Rose, J. (2022, June 6). Axon halts plans to sell flying taser drones to schools. *Motherboard*. https://www.vice.com/en/article/88q4gk/axon-halts-plans-to-sell-flying-taser-drones-to-schools

Rosenberg, J. M., Lawson, M., Anderson, D. J., Jones, R. J., & Rutherford, T. (2021). Making data science count in and for education. In E. Romero-Hall (Ed.), *Research methods in learning design and technology* (pp. 94–110). Routledge.

Saltz, J. S., & Stanton, J. M. (2018). *An introduction to data science*. SAGE Publications, Inc.

Selwyn, N. (2019). *What is digital sociology?* Polity Press.

Shaffer, D. W. (2017). *Quantitative ethnography*. Cathcart Press.

Shelton, C. C., Koehler, M. J., Greenhalgh, S. P., & Carpenter, J. P. (2021). Lifting the veil on TeachersPayTeachers.com: An investigation of educational marketplace offerings and downloads. *Learning, Media, and Technology*. https://doi.org10.1080/17439884.2021.1961148

Simon, P. (2015). The choice of ignorance: The debate on ethnic and racial statistics in France. In P. Simon, V. Piché, & A. A. Gagnon (Eds.), *Social statistics and ethnic diversity: Cross-national perspectives in classifications and identity politics* (pp. 65–88). Springer.

Simpson, T. W. (2016). *American universities and the birth of modern Mormonism, 1867-1940*. The University of North Carolina Press.

Singer, N. (2014, November 16). Privacy concerns for ClassDojo and other tracking apps for schoolchildren. *The New York Times*. https://www.nytimes.com/2014/11/17/technology/privacy-concerns-for-classdojo-and-other-tracking-apps-for-schoolchildren.html

Slade, S., & Prinsloo, P. (2013). Learning analytics: Ethical issues and dilemmas. *American Behavioral Scientist, 57*(10), 1509–1528. https://doi.org/10.1177/0002764213479366

Smith, J. P., & Greenhalgh, S. P. (2017). The role of (real) thinking in education: Why Dewey still raises the bar on educators. In L. J. Waks & A. R. English (Eds.), J*ohn Dewey's Democracy and Education: A centennial handbook* (pp. 99–107). New York, NY: Cambridge University Press.

Spears, V. H. (2019, April 25). Lexington schools are monitoring students on social media. How that prevented a suicide. *Lexington Herald-Leader*. https://www.kentucky.com/article229626509.html

Tufekci, Z. (2014). Big questions for social media big data: Representativeness, validity, and other methodological pitfalls. Proceedings of the *International AAAI Conference on Web and Social Media, 8*(1), 505–514. https://doi.org/10.1609/icwsm.v8i1.14517

van Dijck, J. (2013) *The culture of connectivity: A critical history of social media*. Oxford University Press.

van Dijck, J., Poell, T., & de Waal, M. (2018). *The platform society: Public values in a connected world*. Oxford University Press.

Vitak, J., Proferes, N., Shilton, K., & Ashktorab, Z. (2017). Ethics regulation in social computing research: Examining the role of Institutional Review Boards. *Journal of Empirical Research on Human Research Ethics, 12*(5), 372–382. https://doi.org/10.1177/1556264617725200

Wang, M., & Gebhart, G. (2020, February 27). Schools are pushing the boundaries of surveillance technologies. *EFF Deeplinks*. https://www.eff.org/deeplinks/2020/02/schools-are-pushing-boundaries-surveillance-technologies

Waterman, B., & Kagel, B. (1998). *The Lord's university: Freedom and authority at BYU*. Signature Books.

Watters, A. (2018, February 8). School shooting simulation software (and the problem with how people define 'ed-tech'). *Hack Education*. https://hackeducation.com/2018/02/08/what-is-ed-tech

Watters, A. (2021). Teaching machines: The history of personalized learning. MIT Press

Williamson, B. (2016a). Digital education governance: An introduction. *European Educational Research Journal, 15*(1), 3–13. https://doi.org/10.1177/1474904115616630

Williamson, B. (2016b). Digital education governance: Data visualization, predictive analytics, and 'real-time' policy instruments. *Journal of Education Policy, 31*(2), 123–141. https://doi.org/10.1080/02680939.2015.1035758

Williamson, B. (2017). Learning in the 'platform society': Disassembling an educational data assemblage. *Research in Education, 98*(1), 59–82. https://doi.org/10.1177/0034523717723389

Wrighton, M. S. (2022, February 11). Message regarding data analytics pilot project. *Office of the President, George Washington University.* https://president.gwu.edu/message-regarding-data-analytics-pilot-project

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Trade-offs in a New Instructional Design for Online Distance Learning: Home-supported Time on Task Versus Autonomy

Scholes, V.

Distance Education
Distance Learning
Ethics
Instructional Design
Online

This chapter outlines a novel instructional design for distance education and explores its likely effects, including ethical impacts, for adult learners. The instructional design has adult distance learners nominate two learning supporters from their 'home' environment, such as family or friends. The teacher or facilitator role pivots from focusing on the learner toward guiding the nominated home-based supporters to support the learner. In turn, adult learners engage in some teaching of course concepts to their home-based family or friend supporters. Underlying this instructional design is a rejection of the idea of an independent adult learner in favour of seeing the

learner as an interdependent person. The 'home-support' approach is rooted in the value of reciprocity. It addresses a key problem for adults learning in an online distance context: difficulty in achieving time on task. However, it carries risks for the learner, involving access, equity and autonomy. This chapter discusses these ethical concerns and recommends avenues to mitigate the risks.

Introduction

Adults who study distance education courses online often do so because of the flexibility these courses offer. There is usually no requirement to attend a class at a set place or online class meetings at set times. Much of the online distance education journey can be self-paced rather than designed to suit the timings of lecturers or peers, and this 'asynchronous' aspect of distance learning is part of its appeal for adult learners with busy lives. However, the lack of requirement for 'real-time' human interaction is also a potential barrier to motivation and the cognitive reach of distance education. This chapter outlines the problem and proposes a novel solution. I argue that designers of online distance learning for adults should consider the potential benefits of recruiting people from the adult learner's 'home' environment to support their learning. My proposal positions adult distance learners as interdependent rather than independent individuals, taking a strengths-based perspective on support people nominated by adult learners from their 'home' environments.[1] I discuss some key ethical concerns arising from this novel instructional design approach, including issues of access and equity and impacts on autonomy. This chapter challenges and defends the concept of a 'home' support approach for online distance adult learners.

Methodology

I start from the basis set out by Moore and Ellsworth, with reference to Barbour, that "… technical design cannot be meaningfully developed separate from human context" (Moore & Ellsworth, 2014, Social Responsibility section). An examination of the human context of online adult distance learners informs the design of the 'home support' approach I propose. I aim to explore and argue a rationale for field-testing this approach. The argument is largely conceptual in nature but draws on research in adult distance education to support key empirical claims. More than two decades of teaching and designing online distance courses for adults has helped shape the view I present of the circumstances of adult distance learners, and informs my reasoning. In the framework of moral dimensions Osguthorpe et al. (2018) applied to instructional design practice, I aim to exercise the 'conscience of

imagination': envisioning new ways of doing things, alternative approaches not previously considered, and improving learning and teaching. My disciplinary background in philosophical ethics has also influenced my conclusions. I will explain how the 'home' support approach for online distance adult learners finds a grounding in the ethical theories of care ethics and virtue ethics.

The Context of Online Adult Distance Education

A discussion of online distance education for adults needs some initial definitions. In particular, it is important to clarify how online distance education differs from the online education offered as an adjunct (or accompaniment) to conventional classroom-based education. Sikander (2019) suggests distance education is characterised by the "separation of teacher and learner in time and/or place for most part [sic] of the educational transaction, mediated by technology for delivery of learning content … " (p. 68). Conventional classroom-based education can use online technology to deliver learning, and the online learning may involve the physical separation of teachers and learners. However, this education is not planned around separating teachers and learners in time. Instead, in conventional classroom education, learners are progressed through a course with their peers as a class, according to the teacher's timetable (Nichols, 2022). In the tradition of distance education, however, "the learning experience is based on asynchronicity" (Nichols, 2022, pp.5-6). A real-time connection with teachers or peers is seen by distance education scholars as optional if it would interfere with distance education's traditional aims of "accessibility, cost-effectiveness, flexibility, openness, and scalability" (Nichols, 2022, p.3). Planning for teachers and learners to operate on separate timetables allows more flexibility for learners: they can study at their own pace without interrupting or planning their study around the availability of others. Asynchronicity is a defining feature of online distance education that distinguishes it from the online education that takes place within the paradigm of conventional classroom education.

Many adult learners have busy lives with responsibilities toward other people; a key reason adult learners choose distance learning is the flexibility it offers them to manage studies alongside their other work (Berry & Hughes, 2020; Hodges et al., 2020; Kauffman, 2015; Brown, 2012; Hannay & Newvine, 2006). As noted, the flexibility comes through the asynchronous nature of distance education that allows 'self-paced' learning. Self-paced describes "learning environments that enable individuals to study online in their own time and at their own pace, from their own location" (Moore et al., 2011, p. 131). Flexibility is a double-edged sword for learners, as it can make it harder to find and sustain quality time for their study (Melkun, 2012; Romero & Barberà, 2011). Berry and Hughes (2020, p. 100) note, "Many online students are doing their education online because of full-time work or other obligations including family, and … lack of quality time for school and study is a major concern for many." This is an important consideration as indicators of learner success emphasise the quality time they spend on their study tasks and the importance of quality study tasks (Lee, 2018; Chen & Guthrie, 2019).

Comparing the traditional classroom instructional environment with the environment for adult distance learners, it is easy to see why the latter might struggle with achieving 'time on task'. In classroom-based learning, classes are scheduled at set times on set days in a set place. Classes have a teacher upfront and peers learning alongside. With distance education, however, there is usually no requirement to attend class on a set day at a set time. The distance instructional environment does not typically come with a real-time teacher in front of a learner or peers simultaneously present alongside the learner. Lacking a synchronous class setting with a teacher and peers, distance learners lack social encouragement to focus on their studies at a set time for a set time length. By contrast, the design of instructional environments that use a physical classroom setting helps learners manage their time toward their studies (Brown, 2012, p.41). Time management is a primary driver of academic success for online adult learners (Berry & Hughes, 2020; Broadbent & Poon, 2015; Capra, 2015; Lee, 2018). Melkun (2012, p33) notes that these learners "typically work full-time and struggle to balance competing priorities". Competing demands on one's time is one of the key factors leading to dropout in online courses (Hew & Cheung, 2014; Lee, 2018; Kim & Frick, 2011). Understanding the different environments for online adult distance learners helps us make sense of the lower completion rate for many courses (Ragusa & Crampton, 2018; Brown, 2012).

Instructional design aims to make the online course environment engaging for learners, drawing on best practice models. Designers should draw from models that "anchor student interaction in the instructional objectives and strategies that create, support and enhance learning environments" (Abrami et al., 2011, p88). However, learners need to enter the online learning environment and be in an appropriate psychological state to be able to be engaged. Instructional designers can provide a course timetable, including timely electronic notifications to learners with reminders of course deadlines and encouragement to study. These do not bring the same social support to study as synchronous classes. Synchronous classes pull in the learner at a particular time and fill the learner's environment with people who can support their study at that time, such as teachers, tutors, or other learners. By contrast, the asynchronous learning environment for adult distance students is filled with competing priorities and demands on their time – paid work, housework, care for children or aging parents – around which they need to try to fit in some study. The asynchronous learning environment for online adult distance learners offers much more flexibility but much less social support for engaging in study than synchronous learning.

Do instructional design models (hereafter ID models) address the different environments adult distance learners face? Yes and no. I will follow Dousay (2018) in considering ADDIE as an overarching instructional design process enacted through various models. Well-known ID models such as the Dick and Carey Model, ASSURE, or the Kemp Design Model typically require an initial analysis of the learners early in the process. This analysis should identify the learner characteristics, and for adult distance learners, this would include a busy adult life and need for flexibility. Instructional strategies can be designed with this in mind; for example, highlighting the most relevant parts of resources for learners to focus on and flexibility around assessment due dates. However, the models have neither an explicit nor implied requirement to analyse how conducive the learner's general environment is to study. These models thus imply, through omission, that learners' extramural lives are peripheral to the overall design process.

Established ID models that focus more closely on instruction, such as ARCS-V, Merrill's First Principles of Instruction or Gagne's 9 Events of Instruction, have steps in their design processes that connect instruction with learners' extramural lives. For example, the models may require or encourage learners to connect ideas with their own experiences, or apply a piece of learning in their workplace to understand and integrate new knowledge into their lives. However, if this is the extent to which they make use of features of learners' extramural lives, these models imply that learners' extramural lives are, at best, ancillary parts of the learning process. This perspective is not unusual in the analysis of online learning. For example, Bernard et al. (2009) and Abrami et al. (2011) distinguish three types of interactions as relevant for online learners: student-student, student-teacher, and student-content. Belderrain (2008), drawing on others' work, includes a fourth type: student-interface. Note that an interaction of student-home environment is not envisioned. It seems the interactions that online learners have with people in their 'life' environment do not fall in the ambit of consideration for online distance education.

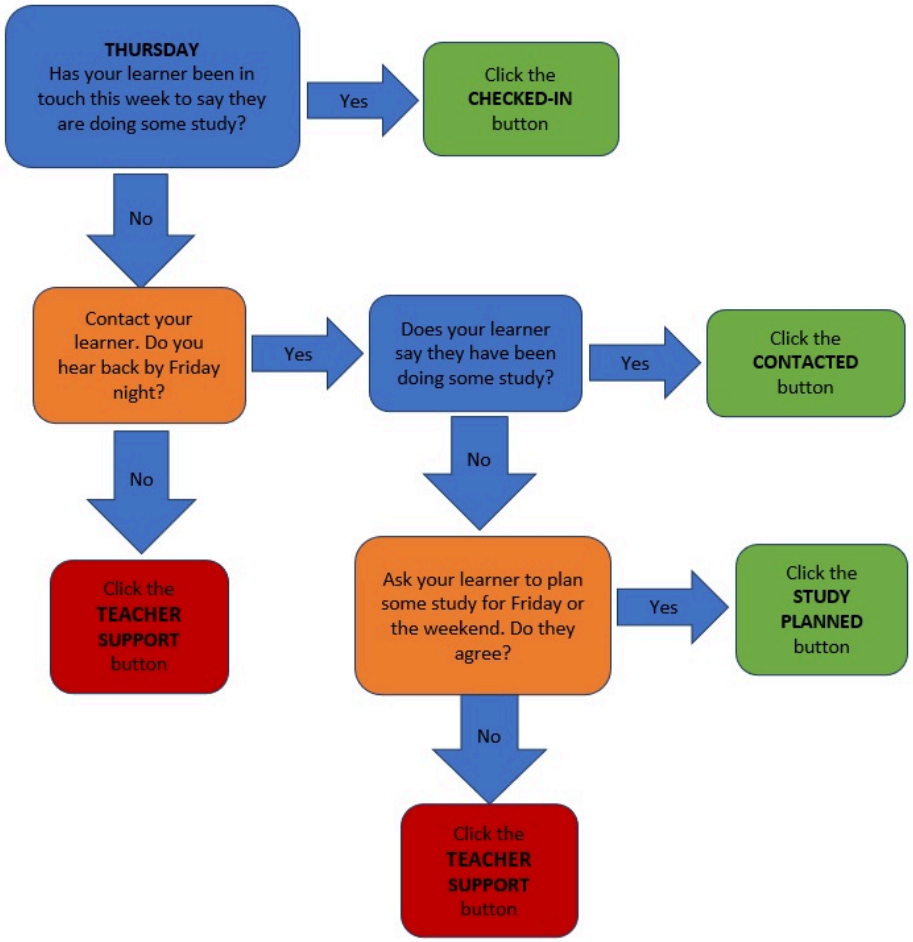
The proposed 'home support' approach

Consider the concept of an instructional design for adult distance learners that takes account of the learning potential of the 'life' environment in which they learn – not just the online course space. In this model, adult learners nominate two people from amongst their family or friends to be their 'home supporters'. The role of home supporters is to help prompt or facilitate more effective 'time on task' for the learner. Home supporters are not expected to explain course content or assess course work; instead, they check in with the learner about the learner's progress in the course. They are there to offer a sympathetic sounding board for the learner's views on managing study time, what support they need, and how they (the learner) might secure this. In return, adult distance learners share part of what they are learning with their home supporters. Teachers or facilitators monitor overall progress, help home supporters with any issues in their support role, and help the adult learners with course content in the usual way.

In the 'home support' instructional design, the online distance course is structured to facilitate this approach. Automated teacher responses are pre-programmed for all online learning activities. This strategy frees the teacher or facilitator to operate at a monitoring level that is a step up from the detailed content. Thus, the teacher or facilitator role pivots from focusing on the online learner to guiding the nominated family or friends to support the adult learner. Communications between teachers, home supporters, and adult learners are mediated by agreed communication technologies (for example, emails, texts, and social media messaging). These communications follow an agreed plan that combines a timetable and a decision-path flowchart, so all participants know what to expect when and the steps to take when things are not going to plan (see Fig. 1). Activities are developed that empower the learner to teach, or share, some course concepts with their home supporters. This sharing of knowledge, learning and support embodies the key value of reciprocity for participants that underlies the 'home support' design approach. Ideally, at the end of the course, successful learners achieve the course credit, and their home supporters receive digital badges that acknowledge their support work.

Figure 1

Example of decision-path flowchart for home supporter



It might seem like a leap of faith, allowing the adult learner to nominate family and friends as supporters and involve 'untrained' people in supporting their learning. Indeed, the research into school students learning by distance, where parents or guardians support the students by taking on the role of 'learning coach', often calls for more training of these home supporters (Hanny, 2022; Nayar, 2021; Connor-Flores, 2021; Barbour & Ferdig, 2012; Hasler-Waters & Leong, 2011). Also, research on students who receive extra coaching from people who are not their teacher suggests that the impact on academic results is often either only weakly positive or non-existent (Cracolice & Broffman, 2021; Moore, 2020; Ricker, Belenky, Koziarski, 2021). However, this is to mistake the role envisaged for family or friends in the 'home support' model. It is not intended that family and friends should engage in any 'coaching' of the adult learner, nor is it expected that the home support will result in higher grades for those who complete the course. Instead, it is simply expected that more learners will complete the course than if the 'home support' were not in place.

A 'home support' model might seem a surprise, given that interactions with the people in the adult distance learner's 'life' environment were earlier noted as potential barriers to learning. A key issue for adult distance learners is quality 'time on task', and an adult learner's obligations to work colleagues, friends, and family can distract attention away from study.

Why not instead have the learners draw support from their peers in the course? The problem with this suggestion is that teachers would need to organise a level of ongoing synchronous contact between the adult learners in the course, which would reduce flexibility; but needing more flexibility is a key reason that these adult learners choose distance education. Unless an adult distance learner is removed from their life environment and placed in a classroom (no longer the flexible online learning situation valued by adult distance learners), then their people will be there, in their environment. It seems more useful to acknowledge this than ignore it.

Acknowledging the people in a learner's home environment also seems more appropriate from the perspectives of the ancient theory of virtue ethics and the more modern theory of care ethics. A virtue-based theory suggests the goodness of an action is not determined primarily by reference to the consequences of the action, nor by reference to, for example, whether the action respects people's rights, but by reference to the qualities of a person of virtuous character. The philosopher Aristotle, pre-eminent amongst virtue ethicists, wrote of friendship as a quality a virtuous person would cultivate (Aristotle, Bks 9 & 10). Good friendship disposes us to act excellently toward our friends, seeing a close friend as 'another self' (Aristotle, Bk 9, ch4). Good friends (including kin relationships) should recognise and try to encourage the good qualities of each other. Rather than viewing the adult distance learner's people from a 'deficit' perspective as potential barriers to learning, this supports the question: What strengths could an adult learner's people bring to the learning situation? How might they draw on those strengths to help the adult learner secure more quality 'time on task'?

The modern ethical theory of care ethics has an even greater emphasis on personal relationships, seeing persons as essentially relational beings rather than independent individuals (Burton & Dunn, 1996). The pre-eminent care theorist Nel Noddings (2013) holds that 'ethical' caring is an effortful attentiveness and responsiveness to the needs of people we are in contact with. Moreover, this caring needs to be reciprocated somehow by the 'cared-for' for the ethics of the action to be complete (Noddings, 2013). This perspective supports having family or friend supporters for adult distance learners, and also having learners give something back to their supporters. I have suggested that this take the form of adult learners sharing their learning with their home supporters.

Consequently, the 'home support' instructional design moves away from the perception of adult learners as largely free-floating independent units, in favour of seeing learners as interdependent adults, adults whose lives are inextricably bound up with other people's lives. The instructional design values the presence and importance of those people for the adult learner and vice versa, hence embracing the value of reciprocity in sharing benefits from online learning. The 'home support' design is proposed as a strengths-based approach to distance learning for interdependent adult learners. In what follows, I will outline and discuss some ethical issues that may arise from adopting a 'home support' design approach for adult distance learners studying online.

Access and equity issues

Suppose we proceed under a ‘home support’ ID model for adult distance learners. Ethical issues will arise as facilitators face learners with different circumstances. Some of these will involve the learners’ nominated home supporters. The most obvious issue is what should happen when a learner’s home supporter can no longer offer support. This situation could occur if, for example:

- A supporter becomes clinically depressed or otherwise seriously ill
- A supporter takes on a new job and struggles with the workload
- A supporter is in the military and is liable to be posted somewhere remote with patchy communications
- A supporter is imprisoned

There are practical solutions for dealing with this issue. For instance, courses can be designed to be completed with just one home supporter if needed. If facilitators note that one of the two supporters has issues that could make their support less reliable, they could check that the second nominee has no foreseeable support issues. Another solution could be to request a third home supporter (with no foreseeable support issues) who remains in the wings and can step in if a supporter drops out.

A deeper problem arises from equity considerations. Some adult learners will have a pool of potential home supporters available to them who are well-educated and may offer valuable extra support with the course, helping to tutor the learner. Other adult learners will not have such a pool of supporters to draw from. The former group of learners seem to have a significant advantage conferred on them by the 'home support' course design, which seems inequitable. It should be noted that the former group will have this advantage regardless of the course design – these learners can always call on their well-educated friends and family for support. Nonetheless, a ‘home support’ design seems likely to encourage this far more than a traditional online course would. However, facilitators can give explanations about the role of the home supporter at the start of the course that are designed to mitigate this advantage. Templated instructions and processes to follow for interactions can help with this. When learners nominate supporters and teachers or facilitators explain the course process and gain informed consent, the onus is on teachers to emphasise the focus and limits of the home supporter role.

Independence and autonomy concerns

One concern with the ‘home support’ design is that the adult learner will develop a reliance on family and friends that will hinder the development of independence. While the learner is exercising some independent choice in their selection of their home supporters, if a learner cannot make progress in their studies without family and friends checking up on them or can only make an assignment deadline because of family and friends imposing earlier deadlines on them, this may be a problem. It is presumably a weakness in instructional design if it impedes an adult learner from developing independence. One response is to concede that this is a problem and deal with it by mixing elements of the ‘home support’ design with a more traditional design. For example, learners could be supported by family and friends over the first half of the course and weaned off this support in the second half.

Alternatively, we could reject the 'hindering independence' criticism. Instead of assessing the 'family and friends' approach against traditional online adult learning, we could compare it with traditional class-based tertiary education. The latter has a co-located class teacher or tutor and peers for every scheduled class. The adult learner taking these classes seems to rely as much, if not more, on other people for support than the adult learner in the 'home support' design. Yet, we would not expect to hear class-based tertiary education criticised as 'hindering independence' simply on that basis. Similarly, I propose that the 'home support' design also ought not to be criticised as unreasonably holding back the development of independence.

We could question whether an instructional design, even if not unduly hindering independence, should still aim for more learner independence for adult learners. However, recall the earlier point about adult distance learners having less support to carve out 'time on task' than traditional classroom learners. Given this, it seems unfair to try to remove some of the available support in the name of greater independence. We should also consider that there may be a separate value to interdependence. If adult distance learners are happy to nominate a couple of learning supporters from amongst their family and friends, this is indicative evidence that they see some value in this interdependence. Furthermore, given that the learning supporter role is structured to provide some reciprocal benefits to supporters within the relationship, the interdependence may also have value to supporters. It may be counterproductive to aim for more learner independence if the effect of this is to 'crowd out' the value of interdependence.

A concern about what might be 'crowded out' under an instructional design cuts both ways, however. What if a design where learners interact with their family and friends 'crowds out' other interactions, such as online interactions with other learners and teachers? Instructional designers incorporate such interactions in online learning courses; technologies include discussion boards, chats, blogs, wikis (Baggio, 2008, pp75-76), and online meetings. Should we be concerned if interacting with family and friends did have an effect of 'crowding out' these other interactions? I think we should be concerned about the potential impact on the adult learner's progress in developing autonomy. The basic argument can be sketched out thus:

1. It is likely that mandating or encouraging engagement with home supporters as part of a course will decrease the amount of time an adult learner interacts with other learners, teachers, or facilitators in the course.
2. Other learners or teachers in the course will likely do a better job of prompting the learner to critically discuss and reflect on their ideas than family or friends would. It is an expectation that other learners and teachers should be prepared to engage critically with the course material, but this is not an expectation of home supporters (and this type of involvement by home supporters might even be discouraged for equity reasons).
3. Critical reflection is better at promoting autonomy than interactions with family or friends.
   Therefore,
4. Having interactions from other learners and teachers 'crowded out' is likely to negatively impact the adult learner's progress in developing autonomy.

Several objections can be raised against this argument. The most radical is to reject autonomy as a goal for education. This approach would find support from British philosopher Michael Hand. In 'Against autonomy as an educational aim' (2006), Hand asks, what is autonomy, and is it desirable as an aim of education? He suggests that for autonomy to be a reasonable goal for educators, it would need to be both learnable and desirable, where desirability is defined as a quality of character whose exercise is generally advantageous to the learner. His article offers a sustained argument that "there is no quality of character one could plausibly call autonomy at which it is reasonable for educators to aim" (Hand, 2006, p536). Hand's article could be drawn on to argue against the autonomy concern with the 'home support' design. Suppose a 'home support' design had the effect of 'crowding out' some critical discussions with other learners and teachers – still, we should not concern ourselves with any likely negative impact on autonomy because autonomy is not a reasonable aim of education!

Frankly, most education theorists will be sceptical of Hand's reasons and conclusion, so I will not try to rely on this to support my argument. In any case, I could not do so in good conscience. I have my own definition of autonomy, which is not covered in Hand's paper. I think my definition is reasonable as an aim of education and that a 'home support' model may impact negatively on this autonomy, so there is an ethical issue for me to address. I define a minimum level of personal autonomy as being able to give a justification for your action or belief, or desire, that is not (merely) someone else's justification. On this definition of autonomy, persons must have thought about their actions, beliefs or desires enough to have chosen (or be able to choose) a justification for them in order for their actions, beliefs or desires to count as autonomous. Justification requires giving reasons. As education assists us in giving reasons, it seems this is a learnable practice. Being more experienced at thinking about actions and beliefs, choosing a justification for the actions and beliefs you adhere to also seems desirable. So I suggest my 'justification'-based definition of autonomy does not seem unreasonable as an aim of education.

My definition of autonomy is a problem for a home support approach to adult distance learning, if the home interactions crowd out interactions with others in the course. In an educational setting, we are encouraged to give reasons to argue for our preferred position. Studies of argumentation by Dan Sperber and Hugo Mercier (Mercier, 2016) suggest that when we give reasons to argue for our position, we tend to be lazy – we use the minimum effort necessary to convince our interlocutor. It is natural to expect our family and friends to be more supportive of our ideas than strangers (or enemies!). We likely expect that friends and family will more readily and less critically accept our explanations or reasons – in which case, we will make less effort to present or argue for our position. In turn, we will more readily and less critically accept input from our family and friends. This approach may do little to develop our ability to give our justifications, and not support gains in our autonomy.

However, we do not expect that other learners or teachers will readily and less critically accept our explanations and arguments. Rather, we should be inclined to put more effort into thinking about, clarifying and arguing for a position on an issue when interacting with these groups. Suppose, as seems likely, that adult learners expect other learners and teachers to be more critical of their positions, than they do family and friends. More interaction with other learners and teachers should then prompt adult learners to do more work thinking things through themselves, thus improving their understanding and ability to give reasons

that represent their thinking work, which is the basis of my definition of autonomy. Thus it seems that a 'home support' design, if it crowds out some interactions with other learners or teachers, will negatively impact an adult distance learner's progress in developing autonomy.

However, I suggest it is unlikely that the interactions with family and friends would completely crowd out any interaction with teachers or other learners. There are more likely to be degrees of dampening of those interactions. The extent to which this dampening occurs will depend on several factors: primarily the learner and their preferences for such interactions, but also the interaction opportunities structured into the instructional materials. Moreover, instructional materials can model autonomy-enhancing practices. For example, each course topic can ensure attention on identifying whose authority is relied on for evidence ('Who said this, and why should we believe them?'). Course materials can also emphasise the practice of examining reasons. Furthermore, consider the reciprocity strategy of adult learners having to teach ro share some course concepts to family and friend supporters. This relationship will likely help the learner develop a clearer or deeper understanding from which to work out reasons to support or reject practices or theories. By aiding this clearer or deeper understanding, the strategy thus supports the preconditions for enhancing autonomy.

A further cognitive gain from the 'home support' design may be experienced by the adult learner's family and friends. Being a supportive audience for an adult learner's explanation of some course concepts may enhance one's cognitive environment. In other words, it may make a supporter's environment more cognitively stimulating and demanding. The effects from this may differ depending on the previous education of the relevant family and friends. The cognitive benefit for friends and family may be seen as a side benefit from the perspective of traditional online learning. It is nevertheless a benefit, and from the perspective of the 'home support' design, it is not peripheral.

Conclusion

I have explored the idea of an instructional design approach to online adult distance learning that provides a role for some important people in the adult learner's life. The motivation for this idea is drawn from elements of the adult distance learner's context: needing flexibility not afforded by traditional classroom instruction but thereby missing the support for achieving quality time on task that the traditional setting offers. I suggested taking account of the adult learner as interdependent and recruiting some of the learner's people – family and friends – to help provide this support, using a strengths-based approach. Based on the value of reciprocity, the 'home support' design aims to facilitate benefits for adult distance learners and their supporters through the learning process.

Having sketched out an argument in favour of the 'home support' instructional design, I then subjected it to ethical scrutiny. I identified several areas of ethical concern, namely, access, equity and autonomy. I argued that access is a practical matter that can be dealt with in the initial set-up of home supporter nominees. The equity concern is trickier, but the inequitable advantage for adult learners with highly-educated family and friends may be mitigated by

establishing a clear understanding of the nature of the participation expected of home supporters. I concede that autonomy may be negatively impacted if interaction with family and friends 'crowds out' interactions with other learners and teachers. But I suggest that this may turn out to be a 'dampening' rather than a complete crowding out; that online distance courses can incorporate other autonomy-enhancing features; and, finally, that there is a potential cognitive gain for 'family and friends' supporters that should be taken into account. As with everything, a 'home support' instructional design is not risk-free. However, I think it has sufficient potential benefits to recommend exploring the design approach in practice.

References

Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., Tamim, R. M. (2011). Interaction in distance education and online learning: using evidence and theory to improve practice. *Journal of Computing in Higher Education, 23*,82–103. https://doi.org/10.1007/s12528-011-9043-x

Aristotle (c.a. 350 BCE). B*ooks 8-9. Nicomachean ethics* (W. D Ross, Trans). Massachusetts Institute of Technology. http://classics.mit.edu/Aristotle/nicomachaen.html

Baggio, Bobbe (2008). *Integrating social software into blended -learning courses: A Delphi study of instructional -design processes* (Publication No.3297938) [Doctoral dissertation, Capella University]. ProQuest Dissertations and Theses Global.

Barbour, M. K. and Ferdig, R. E. (2012). Online learning. In S. McLeod & C. Lehmann (Eds.). *What school leaders need to know about digital technologies and social media*. Jossey-Bass.

Beldarrain, Y. (2008). Integrating interaction in distance learning: A comparative analysis of five design frameworks. In C. Bonk et al. (Eds.), Proceedings of *World conference on e-learning in corporate, government, healthcare and higher education 2008* (pp. 1471–1477). Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/29841

Bernard, R. M, Abrami, P. C, Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., and Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education, *Review of Educational Research, 79*(3), 1243–1289. https://doi.org/10.3102/0034654309333844

Berry, G. R., & Hughes, H. (2020). Integrating work-life balance with 24/7 information and communication technologies: The experience of adult students with online learning. *American Journal of Distance Education, 34*(2), 91–105. https://doi.org/10.1080/08923647.2020.1701301

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education, 27*, 11–13. https://doi.org/10.1016/j.iheduc.2015.04.007

Brown, J. L. M. (2012). Online learning: A comparison of web-based and land-based courses. *Quarterly Review of Distance Education, 13*(1), 39–42.

Burton, B. K. & Dunn, C. P. (1996). Feminist ethics as moral grounding for stakeholder theory. *Business Ethics Quarterly, 6*(2), 133–147. https://doi.org/10.2307/3857619

Capra, T. (2011). Online education: Promise and problems. *Journal of Online Teaching and Learning,* (2). https://jolt.merlot.org/vol7no2/capra_0611.htm

Chen, Z. & Guthrie, M. (2019). Measuring the effectiveness of learning resources via student interaction with online learning modules. *ArXiv Physics Education*. https://doi.org/10.48550/arXiv.1903.08003

Dousay, T. A. (2018). Instructional design models. In Richard E. West (Ed.), *Foundations of Learning and Instructional Design Technology: Historical roots and current trends* (1st ed.). EdTech Books. https://edtechbooks.org/lidtfoundations/instructional_design_models

Hand, M. (2006). Against autonomy as an educational aim. *Oxford Review of Education, 32*(4), 535–550.

Hannay, M. & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. *Journal of Online Learning and Teaching, 2*(1). https://jolt.merlot.org/05011.htm

Hanny, C. N. (2022). *Conceptualizing parental support in K-12 online education* (Publication No.9394) [Masters Thesis, Brigham Young University]. ScholarsArchive Theses and Dissertations. http://hdl.lib.byu.edu/1877/etd12031

Hasler W., L. & Leong, P. (2011). New roles for the teacher and learning coach in blended learning for K-12. In T. Bastiaens & M. Ebner (Eds.), Proceedings of *ED-MEDIA 2011-world conference on educational multimedia, hypermedia & telecommunications* (pp. 2716–2725). Lisbon, Portugal: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/38243/

Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review, 12,* 45–58. https://doi.org/10.1016/j.edurev.2014.05.001

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. *EDUCASE Review.* https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Kauffman, H. (2015). A review of predictive factors of student success in and satisfaction with online learning. *Research in Learning Technology, 23*. https://doi.org/10.3402/rlt.v23.26507

Kim, K.-J., & Frick, T. W. (2011). Changes in student motivation during online learning. *Journal of Educational Computing Research, 44*(1), 1–23. https://doi.org/10.2190/EC.44.1.a

Lee, Y. (2018). Effect of uninterrupted time-on-task on students' success in Massive Open Online Courses (MOOCs). *Computers in Human Behavior, 86*, 174–180. https://doi.org/10.1016/j.chb.2018.04.043

Connor-Flores, L. (2021). *Connecting and communicating: The activation of middle school parents as learning coaches for ELA classrooms in online charter schools* (Publication No.5681) [Doctoral dissertation, Louisiana State University]. Digital Commmons LSU Doctoral Dissertations. https://doi.org/10.31390/gradschool_dissertations.5681

Melkun, C. H. (2012). Nontraditional students online: Composition, collaboration, and community. *The Journal of Continuing Higher Education, 60*(1), 33–39, https://doi.org/10.1080/07377363.2012.649128

Mercier, H. (2016). The argumentative theory: Predictions and empirical evidence. *Trends in Cognitive Science, 20*(9), 689–700. https://doi.org/10.1016/j.tics.2016.07.001

Moore, A. B. (2020). *Increasing learning coach involvement to support cultivating student engagement in K-12 online classrooms* (Publication No.28378617) [Doctoral dissertation, Johns Hopkins University]. ProQuest Dissertations and Theses Global.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *Internet and Higher Education, 14*(2), 129-135. https://doi.org/10.1016/j.iheduc.2010.10.001

Moore, S. L., & Ellsworth, J. B. (2014) Ethics of educational technology. In Spector J., Merrill M., Elen J., Bishop M. (Eds.) *Handbook of research on educational communications and technology*. https://doi.org/10.1007/978-1-4614-3185-5_10

Nayar, T. A. (2021). *Parental support and online sixth-grade students' academic performance: A survey research* (Publication No.305) [Doctoral dissertation, Abilene Christian University]. Digital Commons @ ACU Electronic Theses and Dissertations. https://digitalcommons.acu.edu/etd/305

Nichols, M. (2022). Transforming conventional education through ODDE. In Zawacki-Richter, I. Jung (Eds.), *Handbook of open, distance and digital education*, https://doi.org/10.1007/978-981-19-0351-9_35-1

Noddings, N. (2013). An ethic of care. In R. Shafer-Landau (Ed.) *Ethical theory: An anthology* (pp. 699–712, 2nd ed.). Wiley.

Osguthorpe, R. T., Osguthorpe, R., Jacob, W. J., & Davies, Randall, S. (2018). The moral dimensions of instructional design. In Richard E. West (Ed.), *Foundations of Learning and Instructional Design Technology: Historical roots and current trends* (1st ed.).

EdTech Books. https://edtechbooks.org/lidtfoundations/instructional_design_moral_dimensions

Ragusa, A. T., & Crampton, A. (2018). Sense of connection, identity and academic success in distance education: Sociologically exploring online learning environments. *Rural Society, 27*(2), 125–142. https://doi.org/10.1080/10371656.2018.1472914

Ricker, G., Belenky, D., & Koziarski, M. (2021). Are parents logged in? The importance of parent involvement in K-12 online learning. *Journal of Online Learning Research, 7*(2), 185–201. https://www.learntechlib.org/primary/p/219541/

Romero, M., & Barberà, E. (2011). Quality of learners' time and learning performance beyond quantitative time-on-task. *The International Review of Research in Open and Distance Learning, 12*(5), 125–137. https://www.irrodl.org/index.php/irrodl/article/view/999/1870

Sikandar, M. A. (2019) Open distance learning system: A critical reflection on the issues, challenges and opportunities of open and dual mode universities in India. *Asian Journal of Managerial Science, 8*(1), 66–72. https://doi.org/10.51983/ajms-2019.8.1.1445

Footnotes

[1] While I believe this approach is new in the field of IDT, some indigenous traditions (such as Māori, Pacific peoples, Native American, Ubuntu African) reject the Western individualist perspective of an independent person, in favour of recognising a relational interdependency among persons. For this reason, I call the view I put forward of an interdependent adult learner a 're'-vision of the independent adult learner.

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AI-Driven Instructional Design: Ethical Challenges and Practical Solutions

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Given the unprecedented exponential growth of Artificial Intelligence (AI) technology in our personal and professional lives, its rapid integration into higher education has become an imminent reality rather than a futuristic ideal. AI is getting increasingly recognized as a transformative design tool with the potential to revolutionize the teaching and learning practices of instructional designers, scholars, and educators. Therefore, maintaining a harmonious equilibrium between harnessing the capabilities of AI and upholding ethical principles is crucial for ensuring the responsible integration of AI within educational settings. This chapter offers practical approaches and ethical considerations for the strategic use of AI in designing courses and workshops, thereby contributing to the design and development of responsible and ethically sound educational environments.

Introduction

Given the exponential growth of Artificial Intelligence (AI) technology in our personal and professional lives, its rapid integration into higher education has become an imminent reality rather than a futuristic ideal (Hodges & Ocak, 2023). To provide a context, for the popular social media platform Facebook, it took almost four years to reach one hundred million users, and similarly, for the other famous internet giant, Google, it took almost a year to reach the milestone. However, not surprisingly, ChatGPT, a generative AI (GenAI) tool, surpassed that milestone in just two months. AI technologies can revolutionize and transform the current educational landscape from K-12 to higher education by encompassing personalized learning experiences for learners and adaptive assessments (Trafford, 2023) and workplace training and development contexts (Park, 2024). AI tools employ advanced machine learning techniques and sophisticated algorithms to analyze vast amounts of student learning data, providing educators with insights into individual learning patterns and enabling tailored instruction to meet specific needs (Trafford, 2023).

Artificial Intelligence (AI) is a subfield of computer science focused on developing intelligent systems capable of reasoning, learning, and operating independently. Generative Artificial Intelligence is a specialized area within AI that can generate diverse forms of data such as text, images, and videos by learning from pre-existing materials, a process known as training (Eke, 2023; Baidoo-Anu & Owusu Ansah, 2023).

Since the launch of ChatGPT in 2022 (OpenAI, 2022), educators engaged in continuous discussions related to the practical and ethical use of AI. Early discussions included whether GenAI should be allowed or prohibited in academic settings. However, discussions seemed to move forward, and we need to admit the use of AI tools (as it is difficult to prohibit it) in an ethical way that does not harm academic integrity. There was also a surge of research, primarily conceptual, short, and technical report style, in early 2023, followed by more empirical research in late 2023. The increase in publication accounts for special issues from many journals in various fields, such as business (e.g., Business Horizons, International Journal of Human Resource Management), instructional technology (e.g., TechTrends, Educational Technology & Society), and engineering (e.g., Engineering). Based on a search on Google Scholar on January 29, 2024, using the search terms “ChatGPT” and “Generative Artificial Intelligence,” 66,900 and 999,000 papers were published, respectively. This substantial body of research reflects the widespread interest of scholars in diverse fields and underscores the ongoing evolution of AI technologies. The trend is expected to continue as AI evolves with more sophisticated tools across various modalities, including text-generating AI tools such as Claude from Anthology, Gemini from Google, and Copilot from Microsoft; image-generating tools like Mid-journey, Adobe Firefly, and DALL-E; and video-generating tools such as Runway, Synthesia, Descript, and Wondershare Filmora. Instructional designers have increasingly utilized these AI tools for course design and content generation tasks, such as drafting video scripts, creating multimedia content, generating learning outcomes, and organizing course content.

Previous research on AI in education mainly discussed integrating AI tools in course assignments (e.g., Haleem et al., 2022; Holden et al., 2021). These studies emphasize the importance of the ethical use of AI, especially on how to design instruction and assignments

that do not lead to academic misconduct and plagiarism (AlAfnan et al., 2023). For instance, AlAfnan et al.'s (2023) study examined ways to design writing assignments so that students do not use GenAI to cheat on their written assignments through oral exams, in-person exams, assignments that cannot be quickly answered using GenAI, and the instructor demonstrating the essay prompt on ChatGPT to respond to an example for students.

Scholars remind us that the time has come to revisit the ethical issues emerging from using AI technology as it continues into numerous facets of human life (e.g., Borenstein & Howard, 2021). Hagendroff (2020) notes that, in practical applications, the consideration of AI ethics is often regarded as a supplementary or ancillary aspect rather than an integral component of technical deliberations. This perception frames it as a non-binding, external framework, typically imposed by entities external to the core technical community, rather than as an intrinsic element of design and development. The goal of AI ethics, thus, should not be about enforcing compliance with normative principles; instead, it should foster educators to make informed, empathetic, and self-responsible decisions in morally significant circumstances (Hagendorff, 2020).

Some attempts have been made to incorporate ethics through a professional code of ethics. Despite the importance, it is insufficient as it does not have any tangible impact on decision-making (Borenstein & Howard, 2021). Additionally, although many studies mention the importance of the ethical use of AI and the lack of ethical standards and policies, the select studies state that "we need to use it ethically" without any concrete recommendations. In order to address the existing gap in the literature, this chapter is devoted to a comprehensive discussion of specific examples and practical strategies that instructional designers can employ during the instructional design process, along with guidance for administrators to support these endeavors effectively.

Given the importance and need for ethical considerations in instructional design for AI-based courses, we discuss four main topics: (1) addressing bias and promoting fairness, (2) ensuring transparency and explainability, (3) data privacy and data security concerns, and (4) other critical ethical issues. In this chapter, we provide a scenario (or a case) on possible ethical issues that may arise in instructional design practices, explain the ethical concerns, and offer practical strategies that may help mitigate the ethical issues of integrating AI in instructional design practices. We expect to provide insights to educators, administrators, leaders, and instructional designers in higher education and beyond.

Understanding Ethical Considerations in AI

AI is rapidly transforming into a superpower that enables a small team to affect many people's lives. So, whether you are a builder or user of AI tools or whether you are just somebody who cares about AI's impact on society, it is essential that you learn about these ethical issues and practical strategies to mitigate these ethical concerns so that you can make sure the work you do leaves society better off. Several significant issues historically

associated with technology in education are also present in the realm of AI, thus amplifying the importance of ethical considerations (Hodges & Kirschner, 2024). Therefore, it is crucial to maintain a balance between utilizing AI's potential and adhering to ethical standards to guarantee the responsible use of AI in instructional design (Trafford, 2023).

Building on the foundational obligations and ethical considerations Mhlanga (2023) identified for using AI tools in education, the subsequent section delves deeper into these areas. Specifically, the following section of this book chapter explores strategies for addressing bias and ensuring fairness, enhancing transparency and explainability, safeguarding data privacy and security, and tackling other ethical issues, such as maintaining accuracy and upholding academic integrity. This discussion sets the stage for concluding thoughts on future directions in the ethical application of AI within instructional design practices.

Addressing Bias and Promoting Fairness

As a society, we need to avoid discrimination against individuals based on gender, ethnicity, or any other personal characteristic, ensuring that all are treated with fairness and equity. When AI systems are fed with data that does not reflect these values, AI can become biased or learn to discriminate against a particular group or class of people. In addition to gender stereotypes, AI systems can also inadvertently perpetuate biases related to disability, religion, sexual orientation, and other personal characteristics. For instance, if training data lacks diverse representations or contains prejudiced viewpoints, the AI's outputs may reflect these deficiencies, leading to biased educational content. In other words, for AI systems like ChatGPT, input prompts heavily influence the output (Trafford, 2023). If the input prompts are biased or unjust, the AI will produce biased or unfair output data, which is particularly concerning in educational settings.

Let us explore a scenario where an instructional designer uses a biased input prompt in ChatGPT for course material development, leading to biased and potentially harmful outputs in the instructional design context.

Scenario: Biased Prompt in Course Material Development

Input prompt: "Create a lesson plan emphasizing the importance of strong physical skills in successful engineering careers."

These are some ethical concerns in this input prompt that might lead to problematic output:

- *Reinforcement of Gender stereotypes:* This prompt subtly suggests that physical strength, often stereotypically associated with men, is a crucial determinant of success in engineering. This can reinforce gender stereotypes, as it implicitly undervalues or overlooks other crucial skills like analytical thinking, creativity, or teamwork, which are gender-neutral and equally vital in engineering. AI-generated content based on this prompt would embed these biases in educational materials.
- *Biased Educational Content:* The resulting lesson plan would convey a biased viewpoint, teaching students an unfounded and discriminatory perspective on gender roles in engineering.
- *Impacts on Student Perception and Career Choices:* The prompt narrows the perspective of what it takes to be successful in engineering, potentially discouraging female students who may excel in intellectual or creative aspects of engineering but do not identify with the emphasized physical skills. At the same time, male students might develop an unjustified sense of superiority in these areas.
- *Responsible use:* As educators and Instructional designers, we are responsible for fostering inclusivity and equality, and using such a prompt contradicts these fundamental principles.
- *Long-term negative consequences:* This approach could contribute to gender inequality in engineering and educational settings, reinforcing harmful societal biases.

Practical strategies to mitigate bias and promote fairness while using AI tools:

Prompt engineering refers to carefully designing and formulating prompts or inputs that guide or influence the responses of a Gen AI system, like ChatGPT. This process involves crafting the prompts to accurately and effectively communicate the user's intention to the AI, leading to relevant and valuable responses. As a fundamental component in determining the AI model outputs, it is essential to make the input prompts fair and free from biases (Trafford, 2023). Practitioners can adopt ethical AI interactions by being acutely aware of possible biases and consistently dedicated to fairness (Fedeli & Pennazio, 2021). Trafford (2023) offers practical strategies to reduce input prompts bias (see Table 1).

Table 1.

Practical strategies to mitigate bias and promote fairness

Bias Mitigation	Description

Strategy	
Reflect Diversity	Ensure prompts are inclusive and unbiased, embracing diversity and not favoring any specific group or viewpoint to help instructional designers foster fairness and prevent unintentional bias.
Neutral and Balanced phrasing	Employ neutral and balanced language in prompts, avoiding phrasing that could lead to biased or preconceived answers, ensuring AI models generate unbiased and equitable responses.
Sensitivity to cultural and social contexts	Craft prompts with cultural and social awareness to avoid marginalizing groups, be mindful of impacts on diverse cultures and identities, and continuously learn about biases for fair, prompt development.
Regular Evaluation and Iteration	Regularly assess and refine prompts for effectiveness and fairness, incorporating diverse user feedback to identify and correct unintended biases.
Collaborative and diverse prompt development	Include stakeholders from diverse backgrounds to effectively identify and mitigate potential biases, fostering a more inclusive and fair AI prompt design.
Ethical guidelines and review processes	Implement ethical guidelines and structured review processes for prompt engineering, scrutinizing and correcting biases, and ensuring ongoing fairness and ethical integrity in prompt design.
Promoting Transparency in AI Responses	Where applicable, having AI models explain the reasoning behind their responses can help users understand the influence of the prompt on the AI's output. This transparency can aid in identifying biases in AI reasoning.
Implementing Feedback Loops with End Users	Setting up systems that allow end-users to report biases or unjust responses in AI outputs is essential. Such direct feedback is crucial for the ongoing refinement of prompt design. In the context of higher education, these feedback loops could involve digital platforms where students and faculty can submit observations about AI behavior. This structured input can be analyzed systematically to enhance AI applications in educational settings.

Incorporating Feedback from AI Ethics Boards	Establishing or consulting with an AI ethics board comprising experts in AI ethics, social sciences, and related fields can provide valuable insights. Regular consultations with such boards can guide the prompt development process toward greater fairness and ethical alignment.

To sum up, the influence of input prompts on generated AI outputs is substantial, particularly in educational settings where biased or unjust prompts can lead to skewed AI-generated data. Strategies for mitigating bias include ensuring diversity and fairness in prompts, using neutral and balanced language, being sensitive to cultural and social contexts, and incorporating regular evaluations and feedback. Involving diverse stakeholders in prompt development and establishing ethical guidelines are also crucial. Additional measures such as using AI fairness toolkits, consulting AI ethics boards, promoting AI transparency, and implementing end-user feedback loops further enhance AI interactions' fairness and ethical integrity. These comprehensive strategies underscore the ongoing responsibility of practitioners to remain vigilant and adaptable in creating fair and equitable AI systems.

Ensuring Transparency and Explainability

Ensuring transparency while using AI tools within educational contexts is crucial for comprehending their functionalities and potential. This clarifies an informed understanding of how these tools process information, formulate responses, and underpin their ethical and responsible application (Mhlanga, 2023). However, Numerous sophisticated AI systems function as 'black boxes,' indicating their high performance is accompanied by an inability of the AI to elucidate the rationale for its decisions. The input prompts must be designed to encourage AI models to provide transparent and explainable responses so that the stakeholders can have visibility into how AI models generate their outputs and understand the limitations of this technology. By promoting transparency, practitioners can foster trust and help users make informed decisions based on AI-generated information. As Green et al. (2022) highlighted, a primary concern is that users, especially in educational contexts, may not fully grasp how AI models arrive at certain conclusions. This lack of understanding can lead to misinterpretation and misuse of AI-generated information.

Alongside transparency, explainability is vital in AI-powered instructional design. The instructors and instructional designers should have access to explanations that outline the reasoning behind the AI-generated content, recommendations, and evaluations. Clear explanations foster a deeper understanding, promote critical thinking, and help learners make sense of the outcomes produced by AI algorithms. When AI decisions are opaque, holding the system accountable for errors or biases becomes challenging, which is critical in educational settings where such decisions can significantly impact learning and assessment. Transparency and explainability are also vital to building trust. Users who

understand how AI models work are more likely to trust and effectively use them. Moreover, instructors and instructional designers must understand AI outputs to make informed decisions. Without clear explanations, the potential educational benefits of AI could be undermined.

Table 2.

Practical strategies to ensure Transparency and explainability

Transparency and explainability strategies	Description
Educational Module on AI Functionality	Integrate educational modules or tutorials that explain how AI works, specifically tailored to the context. This could include case studies, examples, or simulations that elucidate AI decision-making.
Audit trail	Creating an audit trail that records both the input prompts and the outputs generated by AI systems enhances transparency and credibility. This process helps distinguish between ideas produced by AI tools and those developed independently by Instructional designers (Halaweh, 2023).
Regular Reporting on AI Performance	Establish a system of regular reports that detail the AI's performance, including accuracy, fairness, and areas where it may struggle. This can help users understand and trust the AI's capabilities and limitations.
User Feedback Mechanism	Incorporate mechanisms for users to provide feedback on AI outputs. This can help identify areas where the AI's explanations are insufficient and need improvement.
Explainability by Design	Integrate Explainability into the AI prompt development process. Instead of treating it as an afterthought, make their operations clear to end-users.
Compliance with Standards and Guidelines	Adhere to existing standards and guidelines for AI transparency and Explainability. These standards can serve as a benchmark for evaluating the AI system. Some prominent standards include the European Union's Ethics Guidelines for Trustworthy AI, IEEE

	Standards Association's Ethically Aligned Design, and AI Explainability 360 by IBM.
Collaboration with AI Ethics Experts	Work with experts in AI ethics to review and advise on the AI models. These experts can help identify areas where transparency and Explainability are lacking and suggest improvements.

By implementing these practical strategies, Instructors and Instructional Designers can address the ethical concerns related to transparency and Explainability in AI, thereby making these systems more accessible, understandable, and trustworthy for educational purposes. This approach enhances the learning experience and ensures that AI is used responsibly and ethically in educational settings.

Data Privacy and Data Security Concerns

Besides the challenge of explaining AI behaviors caused by autonomous learning algorithms, there are also substantial concerns about losing control and trust, mainly stemming from difficulties in managing personal data (Moore et al., 2023). Respecting the right to privacy of its learners is a fundamental ethical responsibility of educational institutions as it signifies respect for their autonomy and rights. For instance, let us consider the below example in Chinese primary schools.

Wang and colleagues (2019) reported that some Chinese primary schools have implemented AI-powered headbands to monitor students' concentration levels during class. These headbands change colors to indicate different levels of focus: red for high concentration, blue for distraction, and white for no activity detected. Additionally, surveillance cameras installed in classrooms track students' phone use and yawn frequency, aiming to analyze engagement and attentiveness. Despite these measures raising significant privacy concerns among the public, schools have reportedly encountered little resistance to acquiring parental consent. One parent mentioned the benefit of contributing to national research and development as a justification for their support (Green et al., 2023; Reiss, 2021).

Some questions to ponder:

- Considering the reported ease of obtaining parental consent, how well do you think parents and students understand the implications of such surveillance?
- What ethical guidelines should be established to govern the use of AI in monitoring student behavior?
- Who should be responsible for setting these guidelines?
- In terms of the potential long-term impacts on students being monitored with such technologies, how might this affect their behavior, stress levels, and overall educational experience?

The above case study serves as a foundation for examining broader security and privacy issues related to using AI tools in educational settings, focusing on the tensions between technological benefits and ethical considerations.

Practical strategies to protect sensitive and confidential data:

It is vital to address how instructors and instructional designers can effectively safeguard sensitive information while using AI tools to design their courses or workshops. Table 3 offers practical strategies to enhance data privacy and security using AI tools.

Table 3.

Practical strategies to protect sensitive and confidential data

Data privacy and security strategies	Description
Establish Comprehensive Data	Develop and enforce strict privacy policies defining how sensitive and confidential data will be used, stored, and shared. These

Policies	policies should be transparent and accessible to all key stakeholders, including students.
Consent and Transparency	Implement mechanisms to obtain informed consent from all stakeholders. Clearly explain what data will be used, how somebody will use it, and the benefits it brings to the educational process.
Data Minimization	Use generic data that is necessary for educational purposes. Avoid excessive data in prompts, which can increase risks and liability.
Training and Awareness Programs	Educate the instructors and instructional designers about data privacy and security practices. Awareness can significantly prevent data breaches.
Anonymization Techniques	When using data for research or analysis, apply robust anonymization techniques to ensure that sensitive information cannot be identified.
Regular Security Audits	Conduct regular security audits and assessments to identify any vulnerabilities in the system.

Other ethical concerns

In addition to the bias, transparency, and data privacy issues, other ethical issues require careful consideration while using AI in educational settings.

Accuracy

The accuracy of the AI-generated output is a significant issue that requires careful attention. While AI tools such as ChatGPT can generate educational content, they can hardly replicate human educators' creativity, nuance, and depth (Trafford, 2023). For instance, imagine the ramifications of providing our learners with misinformation such as the Earth is flat; such a fundamental error would not only skew their understanding of geography but also ripple through related disciplines like astronomy, creating a domino effect of misinformation (Mhlanga, 2023). In addition, when used extensively, the AI tools generate incorrect, nonsensical, or entirely fabricated information, commonly called Hallucination. This issue arises because these AI systems, proficient in pattern recognition and language generation,

cannot access real-world knowledge or truth. Instead, they rely on patterns learned from the data on which they were trained. Extensive use could overwhelm the system, resulting in incorrect or entirely fabricated responses.

Academic Integrity

Educational institutions across the globe are increasingly concerned about the impact of AI tools like ChatGPT on cheating and academic integrity violations. The prevalence of academic misconduct, including plagiarism, is already a concern in higher education (Cotton et al., 2023). For example, a recent study highlights academic integrity as a critical theme in AI tools such as ChatGPT (Sullivan et al., 2023). The authors note that in late 2022 and early 2023, news articles about AI tools such as ChatGPT focused on its implications for academic dishonesty and its potential to democratize higher education access, with mixed sentiments compared to more positive social media discussions or coverage of other AI tools. Despite academic integrity being a more frequent topic, suggesting a public interest in controversies over positive educational practices, the articles highlighted educators' need to redesign assessments to prevent AI-enabled cheating. The discussion also touched on the limited but evolving discussion on university policy adaptations to AI, emphasizing the need for more explicit guidelines on ethical AI use. The potential of ChatGPT to enhance learning, improve employability skills, and support diverse student needs was noted despite its biases and inaccuracies. However, the discourse predominantly from academic and institutional perspectives lacks depth in student engagement and perspectives on AI utilization, underscoring the need for a more inclusive and student-led dialogue on navigating AI tools ethically and effectively in higher education.

Finally, Reiss (2021) highlights a couple of ethical issues of using AI tools in educational settings, such as (1) the need for balance between guiding students towards autonomous decision-making and providing necessary guidance in educational settings and (2) the advent of the role of AI in education related to the well-being of educators due to the increased surveillance and stress. Reiss (2021) argues that while AI might lead to more engaged students, reducing the burden of classroom management for teachers and allowing them to focus more on facilitating learning, it raises concerns about privacy, surveillance, and the added stress of being constantly monitored alongside their students. The sanctity of the classroom as a private teacher space diminishes as data collection becomes more pervasive. For teaching assistants, their future role appears even more uncertain. Despite evidence suggesting that teaching assistants can positively impact learning outcomes with appropriate support and training, the necessity for their role in an AI-dominated educational landscape is being questioned.

Practical strategies to address other ethical issues

Moore et al. (2023) advise that to tackle these integrity issues, educators should focus on two main strategies: firstly, eliminating factors that might encourage cheating, and secondly, guiding students empathetically to identify and steer clear of harmful or irresponsible uses

of AI technology. Table 4 offers some practical strategies that educators and instructional designers could use to address the ethical issues.

Table 4.

Practical strategies to address other ethical concerns

Practical strategies to address other ethical concerns	Description
Implement data verification processes	1. Use a blend of AI output and human input to ensure data accuracy and relevance. 2. Cross-check the AI-generated output against trusted sources
Develop guidelines on acceptable AI use	1. Use AI-generated content as a secondary source. 2. Develop clear guidelines on acceptable AI use in assignments and assessments
Encourage critical thinking	1. Include training modules on effective AI use. 2. Promote ethical use of AI tools by reflecting critically on AI-generated content
Create Training and Awareness Programs	1. Offer workshops and other professional development opportunities on integrating AI tools into classroom settings. 2. Provide resources and other support systems for educators to reduce stress and adapt to AI-enabled classrooms.

Conclusion & Future Directions

With growing recognition of AI's power and danger, the prevailing reaction from educators has been an emphasis on ethical principles (Munn, 2022). Munn (2022) argues that ethical principles are often meaningless, isolated, and toothless unless specific practical strategies like checking the accuracy and audit of generated responses are implemented. Besides major academic journals developing guidelines for their authors to use AI tools, many higher education institutions are developing guidelines and policies. Nevertheless, AI technology will likely develop quickly and with new features requiring continuous institutional

communication. In our chapter, we discussed ethical issues such as (1) addressing bias and promoting fairness, (2) ensuring transparency and explainability, (3) data privacy and data security concerns, and (4) other critical ethical issues. These are significant issues that cannot be resolved by instructional designers alone. As instructional designers are not the sole decision-makers of an institution and are often heavily influenced by university policy and governance, various stakeholders should work together to create an environment that fosters ethical teaching and learning. Moving forward, institutions should develop general policies to guide the organizational member's decision-making process and handle issues as they arise. These policies should also be coupled with related public policy and laws on technology and privacy.

References

AlAfnan, M. A., Dishari, S., Jovic, M., & Lomidze, K. (2023). ChatGPT as an educational tool: Opportunities, challenges, and recommendations for communication, business writing, and composition courses. Journal of Artificial Intelligence and Technology, 3(2), 60–68. https://doi.org/10.37965/jait.2023.0184

Borenstein, J., & Howard, A. (2021). Emerging challenges in AI and the need for AI ethics education. AI and Ethics, 1, 61-65. https://doi.org/10.1007/s43681-020-00002-7

Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 1-12. https://doi.org/10.1080/14703297.2023.2190148

Fedeli, L., & Pennazio, V. (2021). Instructional design and 3D virtual worlds: A focus on social abilities and autism spectrum disorder. In Handbook of research on teaching with virtual environments and AI (pp. 444-460). IGI Global.

Green, E., Singh, D., & Chia, R. (2022). AI ethics and higher education: Good practice and guidance for educators, learners, and institutions. https://Globethics.net.

Hagendorff, T. (2020). The ethics of AI ethics: An evaluation of guidelines. Minds and machines, 30(1), 99-120. https://doi.org/10.1007/s11023-020-09517-8

Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. Contemporary Educational Technology, 15(2), ep421. https://doi.org/10.30935/cedtech/13036

Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 2(4), 100089. https://doi.org/10.1016/j.tbench.2023.100089

Hodges, C.B., Kirschner, P.A. (2024). Innovation of instructional design and assessment in the age of generative artificial intelligence. TechTrends, 68, 195–199.

https://doi.org/10.1007/s11528-023-00926-x

Hodges, C. & Ocak, C. (2023). Integrating Generative AI into Higher Education: Considerations. Educause Review, (August 30, 2023). https://er.educause.edu/articles/2023/8/integrating-generative-ai-into-higher-education-considerations?trk=feed-detail_main-feed-card_feed-article-content

Holden, O. L., Norris, M. E., & Kuhlmeier, V. A. (2021). Academic integrity in online assessment: A research review. Frontiers in Education, 6. https://www.frontiersin.org/articles/10.3389/feduc.2021.639814

Mhlanga, D. (2023). Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning. SSRN Electronic Journal. https://doi.org/10.2139/SSRN.4354422

Meszaros, J. (2022). The next challenge for data protection law: AI revolution in automated scientific research. In M. C. Compagnucci, M. L. Wilson, M. Fenwick, N. Forgó, and T. Bärnighausen (Eds.), AI in eHealth: Human autonomy, data governance & privacy in healthcare. Cambridge University Press.

Moore, S., Hedayati-Mehdiabadi, A., & Law, V. (2024). The change we work: Professional agency and ethics for emerging AI technologies. TechTrends, 68, 27–36. https://doi.org/10.1007/s11528-023-00895-1

Munn, L. (2023). The uselessness of AI ethics. AI Ethics, 3, 869–877. https://doi.org/10.1007/s43681-022-00209-w

OpenAI. (2022). ChatGPT release notes. https://help.openai.com/en/articles/6825453-chatgpt-release-notes

Park, J. J. (2024). Unlocking training transfer in the age of artificial intelligence. Business Horizons. 67(3). https://doi.org/10.1016/j.bushor.2024.02.002

Reiss, M.J. (2021). The use of AI in education: Practicalities and ethical considerations. London Review of Education, 19(1), 5, 1–14. https://doi.org/10.14324/LRE.19.1.05

Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning. Journal of Applied Learning & Teaching, 6(1), 1–10. https://doi.org/10.37074/jalt.2023.6.1.17

Trafford, M. T. (2023). Ignite learning innovation: Unleashing the potential of ChatGPT, prompt engineering, and prompt chaining in course design. RU Institute Press.

Wang, Y., Hong, S., & Tai, C. (2019, October 24). China's Efforts to Lead the Way in AI Start in Its Classrooms. The Wall Street Journal. https://www.wsj.com/articles/chinas-efforts-to-lead-the-way-in-ai-start-in-its-classrooms-11571958181

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