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A TechnoEthical Framework for Teachers

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Abstract: A TechnoEthical Framework for Teachers (TEFT) is introduced to aid educators in selecting and employing educational technologies in ethically sound and pedagogical sensitive ways in their classrooms. TEFT views technology through three key technoethical lenses or perspectives: instrumental, sociomaterial and existential. The instrumental lens is most familiar to teachers and focuses on the policies and laws governing teachers' and students' uses of technology. The sociomaterial perspective attends to technology's built-in biases and how it translates behaviour in prescribed or circumscribed ways. The existential lens considers how students' and teachers' entanglements with technology condition how they experience the world and transform their ways of knowing, doing, being and becoming. Taken together, these three approaches provide teachers with a theoretically robust view of the ethical implications of using technology in the classroom.

Keywords: technology bias, educational technology, posthuman, teacher ethics, K-12 education

Introduction

The incorporation of digital technologies in the classroom stands as one of the most significant, widespread changes in the history of modern schooling. Yet despite several decades of scholarship expressing concern about a broad range of ethical issues involving technology integration in schools such as equity and social justice, teachers have been offered little actionable technoethical guidance beyond reminders to comply with student privacy, data security policies and copyright legislation. To date, only a few technology-focused ethical frameworks have been developed for teachers (Farrow in Brown et al. 2021, Krutka et al. 2019, Spector 2016); several attempts have also been made to integrate ethics into Mishra and Koehlers' (2006) popular Technological Pedagogical Content Knowledge (TPACK) model (Adams 2020, Yurdakul et al. 2012). In 2018, Martin Wellner declared that 'edtech needs to build on the ethical, practical, and conceptual frameworks that combat the nefarious applications of technology' (p. 46). In response to Wellner's call, we propose a TechnoEthical Framework for Teachers (TEFT) to aid educators in selecting and employing technologies in ethically sound and value-sensitive ways in their classrooms.

TEFT is based on the insights of classical (e.g., Heidegger 1962, 1971) and contemporary philosophers of technology (e.g., Ihde 1990), and draws on recent postphenomenological (e.g., Verbeek 2011, 2023), sociomaterialist (e.g., Latour 1999, 2007),

posthumanist (e.g., Barad 2003) and decolonialist (e.g., Rosiek et al. 2020) scholarship to address a more comprehensive range of ethical questions regarding educational technology design, deployment and integration in school. The three-prong ethical framework asks teachers to attend not only to student data privacy and security but also extend their professional responsibilities to include the disclosure and balance of a more robust set of epistemological and ontological concerns regarding technology integration in their classrooms. We begin by reviewing the research literature on educational technology ethics with a focus on teachers' professional responsibilities.

Educational Technology Ethics

Three decades ago, Yeaman, Koetting and Nichols (1994) edited a special issue of *Educational Technology* on the 'the ethical position of educational technology in society.' Drawing on critical theory, feminist scholarship, postmodernism as well as insights from media scholars and educators regarding the 'non-neutrality of [educational] technology' (Bowers, 1988), the articles reflected on concerns ranging from social justice to the importance of maintaining caring teacher-student relationships amid increasing technology use in schools. At the time, Yeaman et al. speculated that the collection was 'the first time that present-day philosophy has been brought into a discussion of educational technology and ethics in a mainstream publication' (1994, 5). Twenty years later, reviewing the research literature on educational technology and ethics, Moore and Ellsworth (2014) declared 'how dramatically understudied this topic has been—and [suggested] that much of this owes to our legacy of viewing ethics as the domain of philosophy rather than action' (113). They also found that the extant research was primarily devoted to developing educational technology professionals' codes of ethics and outlining teachers' legal responsibilities (such as ensuring copyright compliance), rather than to teachers' ethical reflection and decision-making regarding technology use in the classroom.

In 2016, Spector proposed 'a preliminary framework for ethical decision-making with regard to educational technologies', an expansion of the 'Educatic Oath' (Spector 2005) for educational technology professionals he had penned a decade prior. The new framework is intended to be used by a variety of educational stakeholders including teachers and consists of five interacting dimensions—values, ethical principles, people, context, and technology. Values include lifelong learning, inquiry, knowledge, evidence diversity, and respect; ethical principles consist of statements like 'promote benefits and minimize deficits for all involved' (Spector, 2016: 1009); people include developers, designers, instructors, students, curriculum coordinators, etc. However, the framework has yet to find significant traction among teaching professionals. More recently, Moore and Griffin (2022) have offered an approach to teaching ethics for instructional designers and educational technologists. While their design-based approach rather than compliance-oriented approach to ethics is promising, Moore and Griffin's proposal is geared to those creating educational technologies rather than teachers in the field.

Yurdakul et al. (2012) revealed the lack of ethical assessment in the TPACK model and proposed "TPACK-Deep," a model that gives TPACK a new set of wings, one each for Design, Exertion, Ethics, and Proficiency. The Ethics wing or "factor" in TPACK-Deep refers to 'teachers' competencies in ethics regarding teaching profession but also to such technology-related ethical issues as privacy, accuracy, property and accessibilities' (p. 970). Here, ethics is described as a form of 'awareness' and is framed as a competency involving 'paying attention to' a variety of technology issues (e.g., copyright, student access, safety, privacy and technology access). However, Yurdakul et al. make no mention of critically evaluating individual technologies, nor what ethical decision-making might look like with regard to individual technologies.

Focusing their sights on teacher education, Krutka, Heath and Staudt Willet (2019) argue that 'the field as a whole needs to more deeply engage with legal, ethical, and socially responsible understandings of teaching about technologies that seek justice-oriented pedagogies' (568). They offer a series of six questions to help teacher educators and candidates reflect on the question, 'is this technology ethical?' In another article, Krutka, Smits and Willhelm (2021) apply their questions to Google software and hardware in schools and uncover

multiple ethical issues; they call their approach a ‘technoethical audit.’ Krutka, Heath and Smits (2022) recently formed the ‘Civics of Technology (CoT) project,’ sketching curricula and tools intended to ‘encourage teachers and students to critically inquire into the effects of technology on our individual and collective lives.’ On their website, Krutka and colleagues (2022b) outline multiple approaches for conducting a ‘TechEd Audit’: a ‘technoethical audit’ consisting of ten questions; a four-question ‘discriminatory design audit’ intended to home in on embedded biases; ‘five critical questions about tech’ based on the work of media ecologist Neil Postman (1988); and the Baldwin Test with key ‘ed-tech’ additions from Logan (2022). This promising project invites collaboration with other scholars inquiring ‘into downsides and harms of technologies as they work towards more educational and just futures’ (229). While CoT offers multiple frameworks, the project has not yet forwarded an organized, theoretically robust, *and* practical framework useable by teachers in the field.

Scholarly interest in developing an ethics of technology in education has increased significantly over the last decade with the rise of artificial intelligence (AI), big data and student learning analytics (Prinsloo & Slade 2013, Regan & Jesse 2019, Zakharova & Jarke 2021). Concerns include algorithmic biases, data privacy and surveillance, information ownership, autonomy, and digital neocolonialism (Zembylas 2021). It is worth noting that more than two decades ago, Aiken and Epstein (2000) presciently offered a preliminary set of ‘ethical guidelines for AI in education’ which included statements like, ‘respect differences in cultural values; avoid “cultural imperialism”’ (173). Then after years of silence, multiple globally relevant ethics guidelines for AI in K-12 education have now been published (Adams et al., 2021); however, such documents have tended to be policy-focused rather than presented as practical aids for teachers addressing technoethical issues arising in their classrooms.

Extended mind, 4E (Embodied, Embedded, Extended and Enactive) and distributed cognition theorists have also raised new questions regarding the relationship of different technologies to the development and efficacy of learners’ cognitive ecosystems (Heersmink & Knight, 2018). Here, Parsons (2019) argues that educational technology ethics must grapple with ‘technology [as] an extension of our cognitive processes’ and calls for current and proposed ethics frameworks to recognize that ‘our mental states are constituted by our neurocognitive and affective states and a shifting collection of external resources and scaffolding’ (198, 205). Parsons’ (2021) observations align with others who have also described new ethical and societal implications regarding cognitively extended humans. For example, Hernández-Orallo and Vold (2019) suggest that ‘as AI extenders become more powerful and integrated, it will be more difficult (perhaps even unethical) to remove them whenever humans are in education or evaluation contexts...Should cognitive evaluation, including IQ tests, be modified or compared to the situations with and without the cognitive extenders?’ (512).

Despite a recent reinvigoration of its importance, attention to ethics in education technology research continues to lag. Today, more than ever, teachers need to understand the manifold pedagogical issues and ethical risks associated with new technologies so they can make informed decisions when deploying them in their classrooms, ‘especially when students may be pressed into using them for obligatory coursework activities’ (Sayadmansour and Mehdi Nassaji 2013: 298). Any proposed technoethical frameworks for teachers must not only ensure teachers comply with jurisdiction-level policies and laws but must also assist them in uncovering and addressing a wide range of pressing ethical and pedagogical concerns regarding the use of digital technologies, including social justice, equity, student wellbeing, and posthuman becoming via neurocognitive extensions.

Below we describe an approach to integrating technoethics as part of a teacher’s professional practice. The framework was originally inspired by an entry in the *Stanford Encyclopedia of Philosophy* by philosopher and ethicist of technology, Lucas Introna (2017). In the entry, Introna outlines three distinct theoretical views of society’s relationship to technology and their ethical implications: the ‘Artifact/Tool Approach,’ the ‘Social Constructivist Approach,’ and the ‘Phenomenological Approach.’ We adapted these approaches to the classroom situation and renamed them Instrumental, Sociomaterial and Existential technoethics, respectively. The TEFT framework has evolved over several years in the context of a large teacher education program in Canada. The intent was (and is) to provide teachers with a

practical framework for thinking about and doing technoethics in the classroom that considers contemporary theories and philosophies of technology and is adaptable to diverse pedagogical approaches, philosophies of teaching, and theories of learning.

A TechnoEthical Framework for Teachers

TEFT is a three-pronged approach to doing technoethics. The framework's three lenses—*Instrumental*, *Sociomaterial* and *Existential*—are not intended to be used on their own, but as a threefold way for teachers to develop a more expansive grasp of the manifold ethical and pedagogical concerns that every technology will necessarily mobilize in the lives of learners and teachers' everyday classroom practices. TEFT does not equip teachers to uncover every possible technoethical concern a given technology may provoke in their classroom. Nor does it ask teachers to investigate the ethical practices of corporations, the possible biases of the educational software developers behind educational applications, or the ecological impacts of widespread technology use. Instead, it promises to attune teachers to the unique, nonneutral influences of specific educational technologies, and, thus, to the powerful implications of their effects and side-effects on the cognitive, social, political, and cultural ecologies of their students. Such critical attunement allows teachers to seek better alignment of a given technology with theories of learning and development, students' developmental needs, local community norms and cultural knowledges, as well as their own pedagogical beliefs, values, and professional responsibilities.

Below, we introduce each of the three technoethical lenses by providing (1) its theoretical background and view of human beings' relationship to technology, (2) a set of questions for teachers to ask to help them orient and attune to seeing the technology through that lens, and (3) possible ways for teachers to respond in more ethically and pedagogically sensitive ways. These three approaches are not intended to be used independently of the other: each provides access to a unique and important dimension of a teacher's technoethical responsibilities to their students. Overlaps and tensions between the three perspectives will occur. TEFT is illustrated in Figure 1. below and summarized in a table Appendix (see end of document). We also provide an example of applying each technoethical lens to a popular educational technology, ClassDojo.

ClassDojo is a gamified, classroom management application and popular with many elementary teachers in North America (DiGiacomo, Greenhalgh & Barriage, 2022). The app allows teachers to track and reward their students' behaviours via a digital point counter. In the app, students are represented by little monster avatars. The teacher can choose to award students points for positive academic and prosocial behaviour, such as successfully completing their work in an allotted time, keeping their desks clean, holding the door open for their peers, reaching out to a classmate, etc. Likewise, a teacher can choose which behaviours merit a student losing points, for example, being off task, fighting, using inappropriate language, etc. A teacher can choose to award points publicly or privately, and they can design their own reward system based on points earned, individually or collectively as a class. ClassDojo offers additional features like automatic student groupings or behaviour and learning reporting directly to parents or guardians.

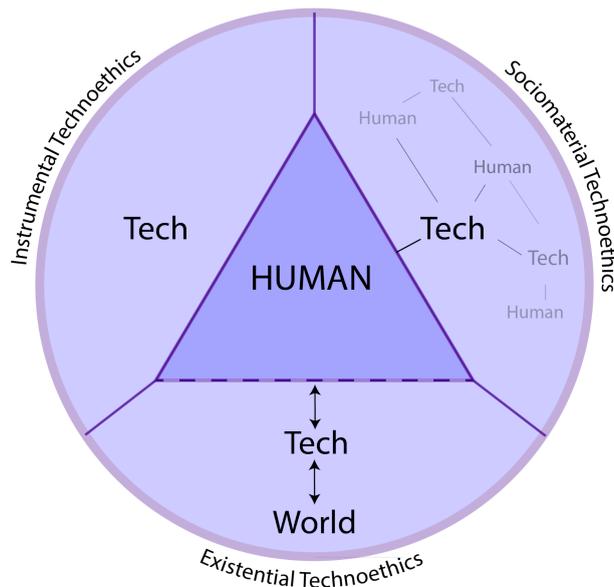


Figure 1. TechnoEthics for Teachers Framework (TEFT)

Instrumental Technoethics

Instrumental technoethics is rooted in Euro-western, humanist philosophical traditions influenced by René Descartes' 17th-century mind-body or spirit-nature dichotomy. By this view, humans are presumed to be rational beings, whereas everything else is instinctual and wild. Humans have souls, whereas other creatures do not. While humanism speaks of the human being broadly and its ethics refers to unassailable human rights, Euro-western society and economics have also been built upon the systemic oppression of peoples whose humanity and human rights have been simultaneously denied (Ellis, 2018).

Instrumental technoethics represents the enactment of a humanist, Cartesian discourse, where human 'subjects' and nonhuman (or less-than-human) 'objects' are ontologically distinct entities. This mainstream understanding of technoethics considers how humans *use* technologies—physical objects, digital apps, etc.—to benefit or harm one another and the world. The ethical questions posed and teachers' professional actions here will likely seem most familiar since many of us have been steeped in the humanist tradition since childhood. Instrumental technoethics situates the locus of agency (i.e., choice and action) and responsibility within the conscious, autonomous, or 'free' human mind.

Theoretical premise

Humans are autonomous, agential beings and thus morally responsible for their actions. Technologies have no or limited agency outside of us and are thus considered value neutral. Humans and their technologies are understood to be distinctly separate beings or entities. Instrumental technoethics thus reflects a traditional Euro-western or Cartesian view of the world. It is neatly summed up in the American National Rifle Association (NRA) slogan: 'Guns don't kill people, people kill people.' From this perspective, technology is 'just a tool' that morally responsible humans use to achieve their own ends. Humans are the sole arbiters of a technology's use, and thus bear the full burden of responsibility for wielding it in service of good or ill purposes. This 'common sense' view of humans' instrumental relationship to their technology is written into contemporary policies and laws across the globe.

Ethical investigation and teacher responsibilities

Instrumental technoethics is primarily concerned with ensuring that humans use technologies in good ways or at least in ways that limit harm to others. Human rights and responsibilities figure prominently. For teaching professionals, awareness of and respect for applicable rules, policies, and legislation regulating the use of information and communication technology is crucial. For example, in Canada, children's data is protected by Canada's Personal

Information Protection and Documents Act (PIPEDA); in the United States by the Children's Online Privacy Protection Act (COPPA); and in the European Union by the General Data Protection Regulation (GDPR). School districts may further constrain teacher and learner technology use through acceptable use policies and codes of conduct.

Instrumental technoethics is evident in teacher common practice. When adopting a new technology, they may ask: What policies and laws are in place to regulate my (or my learner's) use of a given technology to maximize the positive benefits and minimize negative impacts? What human rights might be violated if this technology is used inappropriately? What human rights (e.g., the right to privacy, the right to protection from harm) might be violated if I (or my learner) use this technology in inappropriate ways? Further, teachers and school authorities operate within an instrumental technoethical paradigm when they seek parental consent and learner assent before using a given technology, and when they ensure technology is compliant with applicable policies and laws.

An example of instrumental technoethics in the classroom

At the start of the school year [Mrs. Lee] sends home a Welcome Package that includes a ClassDojo section with student and parent invitation codes, as well as a description of how to download and use ClassDojo features. In order to address privacy concerns up-front, she pre-emptively copies the Privacy Statement listed on the ClassDojo website so that parents are aware of the data security policies in place. (Yuen, 2021, p. 137)¹

Applying an instrumental technoethic, Mrs. Lee recognizes her professional responsibility as a teacher to ensure that any technologies she uses with her students must comply with local privacy and data security regulations. She is also aware that parents may have concerns about their children's privacy, so she 'pre-emptively' provides a link to ClassDojo's Privacy Policy (ClassDojo, 2022). Indeed, ClassDojo prides itself on protecting the privacy and data rights of children. For example, the company hosts a 'Privacy Center' where it states that 'protect[ing] your privacy and security, and giv[ing] you control over your information' are advertised as fundamental to the ClassDojo mission. To use the app, the teacher needs only provide minimal student information; it does not require data on gender, social security numbers, emails, addresses or even student school IDs. Any personal data it collects is stored in state-of-the-art, military-grade servers and then deleted after 12 months. There is no public front-facing student data, and any feedback points or student information is only available within the privacy of the teacher's classroom. ClassDojo does not sell or share any personal user data—whether on registrant information or usage statistics—with advertisers or any other third party. ClassDojo's compliance with the highest of international standards for protecting student privacy is positive. However, ClassDojo does collect non-identifying data, including geolocating usage statistics. While ClassDojo is meant for students to only be able to interact with members of their own class, there is a risk that unintended persons gain access to the classroom through public posting of class registration information, thereby gaining access to communicate with students and see any information or materials these students may have uploaded themselves.

Returning to Mrs. Lee and given few, if any, educational apps achieve a score of 100% across all of CommonSense Privacy Program's 'concern categories,' it is worth reflecting on an individual teacher's professional obligations in the context of instrumental technoethics. ClassDojo's Privacy Policy (2022) currently runs over 20,000 words, not including the wealth of supplementary documents such as the ClassDojo Terms of Service, Cookies Policy, Website Privacy Policy, etc. Is it reasonable to expect a teacher (who then also passes this responsibility along to parents) to read a novel-length legal document to ascertain a technology's compliance

¹The classroom examples are selected from a postphenomenological study of elementary school teachers using ClassDojo in several Western Canadian urban centres (Yuen, 2021) and supervised by one of the authors (Adams).

with locally applicable legislation? Websites like CommonSense² can assist teachers in conducting a preliminary compliance investigation; however, any ‘concern categories’ should necessarily be brought to the attention of the principal and/or the school district for a risk assessment before adoption.

Sociomaterial Technoethics

Whereas instrumental technoethics is based on a humanist or anthropocentric view of the world, sociomaterial technoethics represents a *posthumanist* approach. What is posthumanism? Most simply, it is a view of the world that works to dismantle Cartesian dichotomies like subject/object, mind/body, living/non-living, etc., and instead attends to human-nonhuman hybrid relationships and the resulting heterogeneous networks. Posthumanism is sometimes called a relational ontology: rather than cleaving subjects from objects, this understanding of reality considers entities in terms of their entangled interrelationships. Posthumanism asks us to break our ‘Cartesian habit of mind’ (Barad, 2003, 807), and begin to talk about human-technology *relations* rather than humans *using* technology, and about human-technology value alignment rather than technology neutrality. While posthumanism appears to correct some of the colonialist tendencies of humanism, others believe it is incommensurable with Indigenous worldviews and the project of decolonization (Hird et al. 2022, Zembylas 2018).

Sociomaterial ethics is primarily associated with the scholarship of Actor-Network theorists like sociologist of science, Bruno Latour (2007). Actor-Network Theory (ANT) is concerned with tracing the powerful associations between humans and nonhumans to understand how nothing simply stands on its own. By this view, posthuman existence consists of shifting sociomaterial assemblages and fluid relationships between heterogeneous conglomerates. Moral responsibility is distributed and shared among humans and value-laden nonhumans.

Theoretical premise

From a sociomaterial perspective, technology is a socially constructed, political actor that assembles powerful, networked relations with other human and nonhuman actors. ‘Socially-constructed’ means that humans design and build technologies for human purposes in the context of shared social practices. To say that a technology is a ‘political’ actor means that it is a *powerful* actor—just like us humans. Agency is not attributed to the human being alone; rather, it is shared, negotiated, and distributed across fluid networks of humans and nonhumans, that is, between the human user and the technology that they employ in any action. Taking up a sociomaterial technoethic means we need to revise the NRA slogan to something like: ‘Guns don’t kill people, cyborgs do...[where a] cyborg...is a holistic but often transitory ensemble of human and non-human elements’ (Bourne, 2012, pp. 141, 158). As Latour (1999) argues, it is neither the person nor the gun that kills, but the ‘citizen-gun’ or ‘gun-citizen’, a human-technology hybrid that when assembled, necessarily engages new intentions, associations, and actions. The power or political agency of the human wielding a gun (or other ‘powerful’ nonhuman) is *amplified*, and the distinction between the subject (the human) and the object (the technology) blurs. When we use technology, we simultaneously become human-technology hybrids, cyborgs entangling with, mobilising, and in some cases delegating other powerful entities to accomplish our purposes.

Borrowing from Latour (1999), Verbeek (2011) describes the agency of artifacts via the example of the speed bump—also known as a ‘sleeping policeman’ in Britain. Verbeek points out, ‘Speed bumps...help us make the moral decision not to drive too fast near a school’ (p. 2).

² CommonSense Privacy Program (2022) recently gave ClassDojo a rating of 82% or ‘Warning’ for its privacy and data protection policies. CommonSense routinely assesses and scores popular educational applications across multiple ‘concern categories’ including child safety, privacy and data security. It also rates an app’s compliance with key statutes and regulations such as the Children’s Online Privacy Protection Act (COPPA), Family Educational Rights and Privacy Act (FERPA), and General Data Protection Regulation (GDPR).

This delegation of decision-making is accomplished by way of *scripts* that are embedded into every technology. Technology scripts in advance what the user may or may not do. The speed bump script goes something like this: ‘Drive slowly or you risk damaging the undercarriage of your vehicle.’ A technology’s scripts are sometimes called affordances. Affordances refer to the possible actions a given object or technology offers or encourages a human (or nonhuman) to do. Today’s software technologies present more complex scripts and affordances than speed bumps. For example, PowerPoint prescribes (i.e., scripts in advance) or affords a teacher the ability to construct and show a particular kind of teaching presentation by providing sets of activities that are made possible through its menus, functions, buttons, default settings, etc. Of course, the teacher can create all manner of presentations with PowerPoint. But the point is that every technology has built-in scripts that powerfully sway the actions of the humans who take up a relation to it (i.e., they use the technology). Some software scripts, like today’s Artificial Intelligence (AI) systems, are so complex we may not understand what we are subscribing to when we employ them. Safiya Noble (2018), for example, shows how AI and the data it uses to build its models of the world can engender racial bias.

From a sociomaterial perspective, software encodes values—decisions about what is important, useful, and relevant, and what is not, promoting certain activities while making others impossible or at least difficult to accomplish (Lessig 1999). When software is used in educational contexts, these values and biases are necessarily imported and integrated as teachers and students become entangled with them, translating and sometimes displacing or obsolescing related practices. More generally, we can say that: (1) a technology organises a situation of choice and that, (2) it suggests the choice that should be made (Verbeek 2011). Since ethics is intimately bound up in the choices we make—big and small—teachers need to understand how a technology constructs technoethical situations and nudges human behaviour in prescribed or circumscribed ways.

Ethical investigation and teacher responsibilities

Doing sociomaterial technoethics is sometimes called disclosive (computer) ethics (Introna 2017) because it explicitly tries to uncover—‘unblackbox’ and ‘de-scribe’—then evaluate the ‘embedded normativity in technological systems and practices’ (Brey 2000: 15). In the process, sociomaterial technoethics examines new power relations and political configurations technology mobilizes. This approach pays attention to value-sensitive design, for example, urging software developers to consider their own biases in the process of designing software architectures and algorithms. When adopting this technoethical lens, a teacher may ask questions like: What are the scripts or built-in biases of this technology? What does it afford, that is, what does it invite, encourage or permit its user to do? Conversely, what does it inhibit, discourage or prevent its user from doing? What (and/or whose) values are embedded or scripted into this technology? Whose power is enhanced when this technology is in use and in what ways? Whose power is diminished and how?

While instrumental technoethics may more explicitly fall into the legislated responsibilities of a teacher, sociomaterial technoethics is evident in a more nuanced view of technology deployment in the classroom. Attentive to a technology’s particular biases and powerful scripts, a teacher may choose to employ a technology selectively by adopting only those scripts that support their pedagogical values and/or teaching and learning philosophy. They may refuse a technology in their classroom, even if it is accepted and commonly used across schools. They may adapt a technology, employing certain functions and not others, modifying it, or mitigating its power-shifting biases with alternative activities and discussions that are explicitly cognizant of the technology.

An example of sociomaterial technoethics in the classroom

As Mrs. Erickson adds a ClassDojo point [via the ClassDojo app on her smartphone], an uplifting chime is played through the classroom speakers. Immediately the students sit a little taller, turn their attention towards the teacher, and lower their voices to a whisper — all quietly acknowledging the familiar sound. (Yuen, 2021, p. 100)

From a sociomaterialist perspective, when ClassDojo is integrated into a teacher's classroom routine, it is more than 'simply a tool.' ClassDojo becomes entangled in a complex network of human-technology assemblages already intertwined with and interacting with each other. Teacher and student become ClassDojo-teacher and ClassDojo-student hybrids as the app invites them to participate in ClassDojo scripted ways of doing things in the classroom world. The ClassDojo-teacher might respond to invitational scripts such as 'observe students' behaviours,' 'note positive (and negative) student behaviours by adding points,' 'share information with parents,' etc. A ClassDojo-student might, 'perform positive behaviours to earn points from the teacher', 'compare points obtained relative to one's peers,' 'look forward to talking with their parents about their point total—or not', etc.

In this way, the ClassDojo-classroom situation constructs and sustains technology-enhanced power dynamics that flow between teacher and student and may extend to parents and beyond. ClassDojo-teachers become behaviour recorders, noticing and tallying occurrences of specific behaviours that they have preassigned with a positive or negative valence. When a student is observed behaving in a certain way, the ClassDojo-teacher may award or dock points accordingly. ClassDojo's underlying scripts—'observe the moral actions of others', 'quantify and rank students by their actions'—fundamentally endorse the bias that children must be conditioned to behave according to specific behavioural and cultural norms. For example, Heath and Segal (2021) point out that teachers may 'normalize dominant (White) cultural expectations of behavior' through using ClassDojo rewards.

ClassDojo-teachers are encouraged to communicate student behaviour in terms of rewards, punishments, thresholds, and records, as the datafication of student action in the class becomes an empirical indicator of how students behave from day to day (Williamson 2017, Manolev et al. 2019). With ClassDojo in hand, a teacher's classroom supervision and pedagogical observations are *translated* into surveillance and data entry. The teacher's end-of-day reflections about individual students are necessarily cast against the day's point totals; ClassDojo also makes it easy for a teacher to share this 'empirical' record of student behaviour with parents.

How might a teacher respond to insights gleaned from a sociomaterial technoethical approach? By acknowledging that the ClassDojo-teacher assemblage easily claims moral dominion over disciplinary matters, they can also choose to take actions that serve to return some agency and power back to their students. They can embrace moral ambiguity by inviting students into conversations before using the app, asking questions like 'what should these points mean for us?', 'should we display scores publicly?', 'should we only give points or remove points as well?', and 'how can we use ClassDojo so we are all responsible for our own behaviour?' Teachers can choose not to report data trends of student performance to parents. Teachers can pair ClassDojo with other strategies to mitigate a purely behaviourist approach to managing student choice, like mindfulness exercises, class meetings, talking circles, mediation, and honest conversations. Rather than using it for all students, all the time, teachers can employ ClassDojo privately, with individual students, who may need help monitoring and being mindful of their behaviours throughout the day. Or they can resist the temptation to use ClassDojo as a behaviour management tool altogether, and instead employ it for fun, good-spirited, in-class competitions.

Existential Technoethics

Existential ethics considers how technology *mediates* how we humans think, act and dwell in our lifeworld. Technology in this view is 'world-producing and revealing' (Introna 2019: 315): it participates in co-constituting 'who-what' (Stiegler 1998) we are as human beings. Our humanity, our cultures, and our ways of knowing and being in the world are intimately and inextricably bound up with, extended and conditioned by our technologies. Further, humans and their technologies evolve together. Humans create, design, employ and adapt technologies for their everyday work, learning and living practices. In turn, technologies support and inspire humans to adapt and change the ways we think, act, and perceive our world. Existential technoethics sees technology as integral to hominization, that is, humanity unfolds

not only through our relationships with others but also via our participation with and through our sociomaterial milieu. Human beings are the beings that they are because of their technology.

This technoethical lens has developed from the hermeneutic and existential insights of classical and contemporary phenomenologists like Martin Heidegger and Bernard Stiegler and postphenomenologists such as Don Ihde and Peter-Paul Verbeek, as well as some of the onto-ethico-epistemological understandings of feminist new materialists like Karen Barad and Sara Ahmed. Heidegger's (1962) philosophy of technology figures prominently in existential technoethics. Almost a century ago, Heidegger (1962) showed that Descartes' autonomous ego cogito cannot fully describe a human being, that is, a mind that is radically separated from its surrounding world. Instead, Heidegger proposed that a human is a 'Being-in-the-World' (*Dasein*) who is meaningfully oriented to and inextricably intertwined with their environmental surroundings or *lived* world. Further, our lifeworld is filled with useful things, an equipmental surround which we variously call on to accomplish our projects. Heidegger showed that while we tend to think about and observe technologies as 'present-at-hand' (conspicuous, obtrusive or obstinate) *objects*, technology more usually appears to humans as 'ready-to-hand,' that is, *in relation to our everyday 'dealings' with the world*. As Heidegger described: 'the less we just stare at the [handy]-Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become' (1962, 98). In its ready-to-hand mode, a technology is absorbed transparently into our everyday practices. Heidegger's relational ontology set the stage for rethinking technology as relational webs connecting humans and their lived world. Here, the basic unit of ethical analysis is Being-in-the-world ('Human-World') and technology mediates this fundamental or primordial human-world relation in different ways.

From an existential technoethics perspective, agency is not distributed symmetrically across human-nonhuman networks as in sociomaterial technoethics, nor does it reside exclusively in the willful actions of the human, as in instrumental technoethics. Rather, agency is conceived as responsive *intra*-actions: the capacity to act, to interact, and to be acted upon in relation to our world. Existential agency is given in the immediacy of our situatedness, in our meaningful orientation to our world and the relational correspondences with and commitments to the world around us. On the one hand, we are willful beings that can act on and effect changes in the world; on the other hand, we are also acted upon, influenced and conditioned by the world, a world populated with other humans, nonhumans, and more-than-humans. In order to do their analytic work of human-nonhuman networks, sociomaterialists 'elide the question of what, if anything, may be essential to being human...Indeed, questions of intentionality, autonomy, and responsibility are not able to be addressed from within [ANT's] symmetrical infralanguage' (Sayes, 2014, p. 139).

Existential ethics (re)turns to the question of human beings and becoming in their relationships with technology. It takes a step away from the agential symmetries of posthumanism (sociomaterial technoethics), and back towards humanism (instrumental technoethics). Such a move intends a renewed focus on humanity's special responsibility of world stewardship, while endeavouring to steer clear of humanism's anthropocentric, Euro-western biases including its colonial legacies wherein some humans have not been recognized as human, let alone posthuman (Dernikos et al. 2020; Tallbear 2015). Existential technoethics is thus located in the provocative tensions between humanisms and posthumanisms and resonates in many ways with a relational ontological situatedness long articulated in Indigenous ways of knowing (Rosiek et al. 2020; Mika 2017).

Theoretical premise

Technology is a *medium* through which humans perceive, act and exist in their world (Strate 2016); as such, technology convenes an 'ongoing horizon of meaning and action' (Introna 2017). Returning to our gun analogy, Evan Selinger, a phenomenological philosopher of technology says, 'Like many other technologies...guns mediate the human relation to the world through a dialectic in which aspects of experience are both 'amplified' and 'reduced'' (2012, para. 8). A ready-to-hand gun dramatically amplifies or extends a person's ability to harm others: its presence opens up a world where it is suddenly possible to kill humans and other living creatures almost instantaneously. Introna (2017), another phenomenological

philosopher of technology, adds that '[human beings] and technology co-constitute each other from the very start; they are each other's ongoing condition or possibility for being what they are.' We humans are technological beings. In the same way that we cannot think of a spider without its web or a fish without water, we cannot think of ourselves as humans outside of our technologies and environmental surroundings. Our technologies *co-constitute* who we are as human beings.

Existential technoethics pays attention to the ways in which different technologies shape and condition how we experience, perceive, and make meaning in the world. Here, the focus is not only on human-technology hybrids and their sociomaterial entanglements but also on how Beings-in-the-World (*Daseine*) change as they become relationally involved with (ready-to-hand) technologies, that is, as they (learn to) skillfully cope with their lifeworld. Of interest are the different kinds of relations that humans convene with their technologies, and thus the ways that different technologies mediate human relations to the world. In his postphenomenology of technics, Don Ihde (1990) shows that 'technologies, by providing a framework for action . . . form intentionalities and inclinations within which use-patterns take dominant shape' (pp. 140–141). He uncovers several variations of human-technology-world (HTW) relations that structure and shape our worldly involvements: embodiment, hermeneutic, alterity and background.

Ihde's postphenomenological inquiries also discovered that the experiential structure of all HTW relations share two invariant aspects: amplification and reduction.

The *reductive dimension* of a medium [acts] simultaneous with...[and is] inextricably bound to the *amplificatory dimension* (which is usually regarded positively) ... It is together that this amplification-reduction makes a medium nonneutral or transformative of human experience. It is moreover, a feature of every technology. (Ihde 1983, 56, *italics* in original)

The importance of recognizing the amplification-reduction structure of our medial relationships with technology is echoed in the work of media ecologists like Marshall McLuhan (1964), Walter Ong (2005) and Neil Postman (1993). Existential technoethics encourages us to be mindful of our everyday relationships with different technologies and our larger media ecology. Ultimately, this ethic asks teachers to consider 'how shall we live?' (Hall 2022) through understanding that technologies 'give shape to what we do and how we experience the world. And in doing so, they contribute actively to the ways we live our lives' (Verbeek 2011, 1). Striving to understand the myriad ways that technologies condition us is central to this approach.

Ethical investigation and teacher responsibilities

Existential technoethics examines technology mediated human or 'being-in/with-the-world' and their intra-actions. The focus is on human perception, ways of knowing and 'who-what' (Stiegler 1998) we are becoming in the context of our evolving technological milieu. An existential approach to technoethics asks: What cognitive, perceptual, relational, cultural, and actional capacities does this technology enhance or amplify? What aspects of human being and becoming does it diminish, atrophy, or reduce? What habits of mind, body or relation does this technology scaffold? Dismantle? What perceptual frameworks or 'ways of knowing' the world (and others) does it privilege? Render obsolete? What sort of beings are we when we are intra-acting with this technology? 'Who-what' will we (and our students) become? In what ways does this technology contribute to living well? Or not?

An existential technoethic involves teachers in developing an ongoing, critical attentiveness to the roles and significances of the wide range of technologies and their complex interactions with students in the ecology of the postdigital classroom. A teacher may watch for the nuanced shifts in ways of knowing and understanding of self in the world that a technology convenes and mediates. They may plan a technology fast with their students (Adams & Lemermeyer 2020, Damico & Krutka 2018). Temporarily abstaining from using a technology makes visible the taken-for-granted and otherwise invisible environment the technology has been sponsoring in the background. Abstaining from 21st-century technologies for 24 hours and documenting key events allows students to experience firsthand the ongoing existential

implications and hermeneutic effects that today’s technologies are enacting on their thinking, doing and being in the world.

Beyond selecting a technology for its particular features or application to support a learning objective, this technoethics prompts teachers to also weigh how this technology will support the developmental needs and well-being—cognitive, psychological, physical, spiritual, social, and cultural—of the learner along with their community and culture. Here, a teacher could notice how a given technology may contribute to (or erode) the development and maintenance of a diverse, inclusive and resilient media ecology within the classroom and beyond. As Yuk Hui (2023) recently argues, ‘noodiversity,’ that is, the rich and varied ways of knowing that uniquely characterize different cultures, ‘has been maintained by a *technodiversity*...emerging from the locality and always in exchange with other localities’. Teachers are uniquely positioned to be key stewards of their students’ knowledge and culture ecologies by ensuring a diverse media ecology.

An example of existential technoethics in the classroom

When the student saw his points on the board and discovered how low the number was compared to his classmates, he started crying. He felt that he had missed many chances to increase his ClassDojo points and was too far behind to catch up. He didn’t want to be seen as the ‘bad student with the fewest points.’ That’s when I realized my students actually take this system seriously, and I started to think about how to make the system more fair by resetting the points every month.’ (Teacher in Yuen 2021, 117)

ClassDojo changes what a teacher and their students do, but it also changes how the teacher and students perceive themselves and their world. In a classroom where ClassDojo is in use—that is, when it is transparently absorbed into the everyday practices of the teacher and learners—a child regularly sees themselves reflected back as a little cartoon monster avatar, among their little cartoon monster peers. Most significant to the young learner, though, is the single number listed to their avatar’s right in a little but prominent green circle (Figure 2). The number announces the child’s numeric value relative to their peers. The child’s point tally may grow, decline, or remain unchanged through the hours, days, and weeks of the school year as the teacher observes (or does not observe), judges their behaviour then records a positive or negative assessment in ClassDojo.

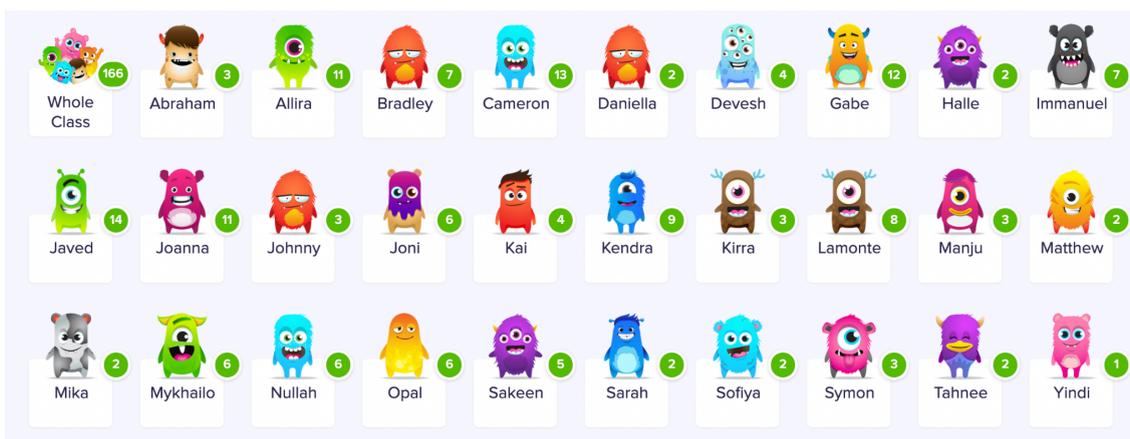


Figure 2. A sample ClassDojo display

Bringing ClassDojo into their classroom, a teacher should ask questions like: How might learners perceive their world differently when ClassDojo is in play? What picture of the world does this application amplify for the teacher and the students? What picture of the world is reduced? As with sociomaterial ethics, the teacher should also pay attention to what a child *does* differently, while also considering the habits of mind, body, and relation that this

technology is scaffolding. Does it change how the teacher thinks, acts, or perceives themselves as an educator?

The anecdote of the child distraught over being a ‘bad student with the fewest points’ provides insight into how a learner might perceive the world and themselves differently when ClassDojo is being used in their classroom. ClassDojo, as a hermeneutic overlay on the classroom world, translates the self-image of each student to a number based on past observed actions that have been judged and tallied. By committing to regularly reset the points, the teacher sought a balance between recording and reinforcing prosocial behaviour in her students with the onerous and damaging consequences of a judicial system that refuses to forget misbehaviour amongst a student population in the process of learning social norms and mores.

ClassDojo also shapes how teachers perceive themselves as educators even as it participates in the kind of classroom world they create for their learners. In choosing to use ClassDojo, the teacher commits to being in regular contact with the app, a possible distraction from their direct interactions with the students. They must also decide how important the tally system is to the development and well-being of their learners, and what sort of behaviours warrant record keeping. While classroom management and its hidden curriculum have always been a part of school-based education, the mediatory, focal and background effects of ClassDojo tend to strengthen a moral code that may be at odds with the teacher’s pedagogical philosophy, the developmental interests of individual children, as well as family, societal and cultural norms. Applying an existential technoethic can assist teachers in reflecting more critically and thoughtfully on the manifold perceptual, cognitive, social and cultural effects and side-effects of inviting a new technology into a classroom ecology.

Conclusion

The digital obliges us to rethink education.
(Stiegler in Kinsley, 2013)

Heidegger (1971) once offered a sustained reflection on ‘the question concerning technology’ to lift the taken-for-granted realm of technical things into the light of critical inquiry; postdigital scholarship has revised this important quest to ‘the question concerning the digital’ in today’s posthuman, networked world. The Technoethical Framework for Teachers provides a three-fold approach to ethical inquiry and decision-making regarding the integration of digital technologies in educational contexts. Technoethics is not only about making good decisions based on what an educator believes is right and what is wrong regarding technology use in the classroom. It involves a critical examination of an educational technology via three different lenses, then carefully weighing the results relative to different and sometimes competing sets of values. TEFT asks teachers to investigate a digital technology’s privacy policy and terms of use then compare those to the rights and responsibilities of teachers and students and other applicable policy and law; to uncover the scripts embedded in a technology and thus understand how they may shape behaviour and support different power structures; to clarify their own values as a teacher and those of the communities they serve; and to analyze the ways in which a technology participates in amplifying but also diminishing perceptions, ways of knowing and experiencing the world, and even changing who we are as human beings and in relation to each other. TEFT asks teachers to consider digital technologies not only as tools, but also as political artifacts, as teaching assistants, as cognitive extenders and as meaning makers in the classroom.

From an instrumental technoethical perspective, teachers must pay attention to the policies and laws governing their professional lives in relation to learners and act accordingly. The focus is on regulating teachers and learners’ uses of technology in good ways that respect basic rights. In the case of sociomaterial technoethics, the human being is re-envisioned as part of fluid assemblages and networks composed of humans and nonhumans. Here, technologies are seen as (1) extending the power of its human user, and (2) scripting the kinds of choices that the human being may make. Agency is found in the connections between humans and their technology. Technology creates situations of choice and thus stands as a co-participant in ethical

decision-making. The technology does this through its scripts and forming relations of power. According to this perspective, teachers should be aware of what a given technology invites a teacher or learner to do, as well as what it may discourage and inhibit a teacher or learner from doing—and possible changes to power relations with others, especially with and between learners. The focus is on how technology may alter (e.g. make easier or more difficult, empower or frustrate) the actions of teachers and learners.

In the case of existential technoethics, the interest is in how our entanglements with technology condition us as ‘Beings-in/with-the-World’ and thus transform our ways of knowing, doing and being. By this view, every technology produces or reveals a new way of knowing the world; every technology mediates and extends our thinking, perceiving, and acting in different ways. This ethical approach asks that teachers consider the larger ecology of our technologized world, and how this complex situation co-constitutes us as individuals, framing how the world shows up for us. As a teacher, existential technoethics involves discerning what ways of knowing are being privileged, amplified, and extended when a learner is using a given technology, and what ways may be undermined, underrepresented, and diminished. TEFT’s three technoethical lenses—instrumental, sociomaterial and existential—are not intended to be applied alone but considered together as part of a teacher’s professional practice and ethical decision-making process regarding appropriate technology integration in the classroom.

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Appendix. TechnoEthics for Teachers (TEFT) Summary Table

	Instrumental Technoethics	Sociomaterial Technoethics	Existential Technoethics
Type of ethical concern	<ul style="list-style-type: none"> Instrumental, means-end. Focuses on technology's cause-and-effect dynamics and believes society should regulate humans' technology use. 	<ul style="list-style-type: none"> Sociomaterial, political, power relations. Focuses on hybrid actions of humans and technologies; views society as networked assemblages of humans and non-humans where agency is distributed. 	<ul style="list-style-type: none"> Existential, hermeneutic, phenomenological, media ecological. Attends to how the technologies we build subsequently mediate our lived experiences, altering perceptions, actions, thought processes, values and relations with others.
The "moral status" of technology	Technology is neutral, devoid of inherent biases or values. It is a mere tool that humans can employ for positive or negative purposes. Technology should be managed and overseen by society.	Technology is non-neutral and socially constructed. Technologies possess inherent scripts that guide our actions in biased ways. Technology acts as a political participant in our interconnected world.	Technology is non-neutral and co-constitutive of human being; it is intimately intertwined with human values, knowledge structures, and existence. Technology is a continuously evolving landscape of meaning and action. It mediates our interactions with the world, intertwining the human with the technical.
The basic unit of ethical consideration	<ul style="list-style-type: none"> Human, Technology Views humans and technologies as distinct entities, emphasizing human autonomy and drawing from the Cartesian dichotomy. 	<ul style="list-style-type: none"> Human – Technology Envisions humans as part of interconnected networks, encompassing both human and nonhuman entities. Agency is distributed within and across these actor-networks. 	<ul style="list-style-type: none"> Human ⇌ Technology ⇌ World Technology mediates our experiences and relationships, focuses on interconnectedness among humans, technology, and the world (e.g., Human-Technology-World relations).
Illustrative quotes	<p>(1) 'Guns don't kill people. People do.' (NRA slogan)</p> <p>(2) 'Technology is just a tool.' (Gates 1997)</p>	<p>(1) 'Which of them, then, the gun or the citizen, is the actor in this situation? Someone else (A citizen-gun, a gun-citizen)' (Latour 1999).</p> <p>(2) 'Guns don't kill people, cyborgs do' (Bourne 2012).</p>	<p>(1) 'Like many other technologies...guns mediate the human relation to the world through a dialectic in which aspects of experience are both "amplified" and "reduced"' (Selinger 2012).</p> <p>(2) 'Every piece of technology is an expression of cultural and social frameworks for understanding and engaging with the world' (Brown, Whaanga, & Lewis 2023)</p>
Approach to ethics	Regulate human's technology use to prevent negative impacts through policy and law.	Disclose the biases or values a technology possesses; use, adapt and (re)design technology accordingly.	Explore our co-constitutive relations with technology—how humans and technologies simultaneously influence and shape one other's existence; create a healthy, balanced media environment.
Ethical investigation	<ul style="list-style-type: none"> Research tech-use policies. Understand relevant laws, e.g., privacy, copyright. Read app's privacy and data-sharing policies. 	<ul style="list-style-type: none"> Open the 'black box' of technology to understand its scripts. Recognize a technology's biases and how it influences human actions. Be aware of one's values and those of different cultures. 	<ul style="list-style-type: none"> Observe students' interactions with technology. Use technology breakdowns to reveal its influences. Reflect on the Human-Technology-World (HTW) relations and apply the McLuhans' Laws of Media.
Ethical and pedagogical questions posed	<ul style="list-style-type: none"> How does a technology impact human rights, e.g., privacy? What are teachers' professional copyright obligations? How best to educate students in digital citizenship? 	<ul style="list-style-type: none"> What biases are intrinsic to this technology? Which default settings are activated? What actions does this technology encourage or discourage? Whose power and values are prioritized or undermined? 	<ul style="list-style-type: none"> With this technology, what habits of mind are strengthened; what habits are atrophied? What perspectives, ways of knowing or knowledge systems does this technology amplify? Diminish? In what ways does this technology alter students' or teachers' thoughts, perceptions, or relationships with others?
Possible ethical responses	<ul style="list-style-type: none"> Ensure a technology aligns with existing policies (e.g., Acceptable Use Policy) and laws (like COPPA). Monitor students' technology use for compliance. Contribute to school/district policies that amplify technology's benefits and mitigate its downsides. 	<ul style="list-style-type: none"> Select technologies that support one's teaching values. Use a technology's scripts selectively. Modify technologies to reflect specific pedagogical values. 	<ul style="list-style-type: none"> Notice the habits of mind, body, and relation the technology supports and develops in students; observe how technology-mediated perceptions shape students' worldviews. Organize tech-free days and reflect on the experience together. Ensure a balanced technology environment in the classroom tailored to students' developmental and holistic needs.