

Neutrality, “New” Digital Divide, and Openness Paradox: Equity in Learning Environments Mediated by Educational Technology

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Abstract: In recent years, a critical turn in the Learning Sciences has begun to consider issues of equity, power, and ideology in the design of educational interventions. While this scholarship has made important contributions to our understanding of learning in relation to these issues, less work has addressed the limitations of design approaches in the context of educational technology. Surveying emerging literature in this area, this paper outlines three key considerations for learning scientists seeking to address issues of equity when studying, designing, and implementing technology-rich environments. These issues, taking new forms across technologies and digital media, we identify as: the Neutrality Facade, the “New” Digital Divide, and the Openness Paradox. Finally, the paper offers three directions for addressing power issues in learning environments mediated by educational technology and digital media: critical design methods, critical digital pedagogy, and critical design literacies.

Introduction

In the Learning Sciences, there has been increasing interest in addressing issues of power in learning environments. Scholars in the field are taking steps towards addressing socio-political dimensions in the study and design of equitable learning environments (e.g., Booker, Vossoughi, & Hooper, 2014; Esmonde & Booker, 2016; Uttamchandani, 2018). Researchers offer multiple directions towards equity in research and practice (e.g., Uttamchandani, 2018), such as: (1) pedagogies that support diverse meaning-making and help learners position themselves in diverse ways (e.g., The New London Group, 1996; Nasir & Vakil, 2017); (2) methodologies that advance knowledge construction, decolonization, and participatory design (e.g., Bang & Vossoughi, 2016; Patel, 2016); (3) examining participation structure to challenge power dynamics in interactions among learners and teachers (e.g., Vakil & de Royston, 2019); and (4) engaging students in complex socio-political topics through curricular interventions to catalyze conversations about issues of inequity (e.g., Vakil & de Royston, 2019). While these issues have been addressed through multiple pathways around pedagogy, methodology, and interaction dynamics in the learning setting (Uttamchandani, 2018), less has been done with respect to issues of equity and power in the design of learning environments mediated by educational technology and digital media (e.g., Barab and colleagues, 2007). It is promising that these discussions have started to emerge in LS communities (e.g., Wise & Schwarz, 2017; Pinkard et al., 2017) as they consider the future of educational technology and technology-rich environments, stressing the need to think about agency and diverse epistemologies (e.g., Tchounikine, 2019; Wise & Schwarz, 2017).

In this conceptual paper, we draw upon interdisciplinary work on learning, digital media studies, and critical digital literacies to suggest a framework that examines educational technologies as sociotechnical systems that are in dialogue with content and critical pedagogy, with the contexts in which those technologies are implemented, and the procedurality of algorithms that structure user activity (Aguilera et al., 2020). We argue that technologies are not simply technical objects; rather, they are systems that exist in dynamic interaction with learners, tools, norms, histories, methodological procedures, and cultures (Srinivasan, 2018; Dobson, 2019). If we hope to design and reimagine equitable learning environments that disrupt power imbalances across place and space, we should pay more attention to all aspects of learning as an ecological system (Gutiérrez, 2016; Srinivasan, 2018), including a critical ethical lens on the consequences and unintended consequences of the designed innovations and dignity of communities we work and design innovations with (e.g., Toyama, 2015; Srinivasan, 2018; Vakil, 2018).

Power issues in technology and digital media

Digital media and technologies have changed how people communicate (Baym, 2015; Srinivasan, 2018), created new opportunities for learning both in and out of school settings (Gee, 2012, 2017; Ito et al., 2018), and provided tools for collaboratively constructing knowledge (Nielsen, 2011). In a digitally connected, world such opportunities include interacting with peers, people, and technology systems (Ito et al., 2018); taking part in varied communities of practice and affinity spaces (Gee, 2017); helping people to network, exchange, and share

resources in online communities (Baym, 2015; Srinivasan, 2018), harnessing collective intelligence and knowledge construction to solve problems (Nielsen, 2011; Toyama, 2015); engaging in distributed learning settings (e.g., Mawasi et al., 2020; Pinkard et al., 2017); experiencing multiple identities (Gee, 2017), and enabling digital storytelling for historically oppressed populations (e.g., Srinivasan, 2018; Pinkard et al., 2017). Despite these affordances, the implementation of digital media and technologies for real-world use has been associated with new problems, including pedagogical challenges, equity and power issues, inequality issues related to accessibility and digital divides, social reproduction of injustice across different contexts and systems, and bias toward certain groups of users (e.g., Dobson, 2019; Noble, 2018; Reich & Ito, 2017; Srinivasan, 2018; Watkins & Cho, 2018). Building on a synthesis of existing literature, including equity-oriented approaches, we address these issues through three connected dimensions: (1) the Neutrality Facade; (2) the “New” Digital Divide; (3) the Openness Paradox.

The neutrality facade

Put simply, the *neutrality facade* describes the ways in which technology in general, and digital technologies in particular, are positioned as ideologically “neutral” tools that can be used for good or ill. However, as educational historians, scholars of science, technology and society (STS), and digital humanists have identified, digital technologies are always created by *someone*, and thus are inevitably imbued with the perspectives, biases, and subjectivities of their creators, whether explicitly recognized or not (Montfort et al. 2012; Kranzberg 1986; Watters 2014). In her book *Algorithms of Oppression*, Noble (2018) describes how search engine algorithms, particularly those employed by Google, return particularly racialized and sexualized results for sometimes seemingly innocuous search terms. Her research found that images of women and racially minoritized individuals were a particular target of these misrepresentative search results, though Google has since updated its image search algorithms in light of public scrutiny that originated with Noble’s study. In another example, Kopty (2018) describes that while online platforms such as Twitter afford a space for activists to communicate, the power hierarchies of offline spaces are reproduced among users based on factors such as gender, geography, and social capital. In short, digital technologies as systems are far from neutral (Dobson, 2019; Noble, 2018; Srinivasan, 2018), as their development and implementation are influenced by existing social norms (Kopty, 2018; Noble, 2018), political injustice (Kopty, 2018; Noble, 2018), powerful institutions and corporations that carry their own economic and political agenda when designing and developing such systems, and individuals (e.g., researchers and engineers) whose labor and creativity shape these systems and methods to study them (Baym, 2015; Dobson, 2019; Noble, 2018; Srinivasan, 2018).

The “New” Digital Divide

When we discuss the “New” Digital Divide, we draw on a concept that describes unequal access to information and communication technologies, particularly the internet and internet connected devices. However, recent research into internet accessibility has demonstrated that inequities in this area, particularly along economic lines, have been shrinking over time (Pew Research Center, 2019). What we see as a “new” digital divide, however, are the disparities between the increasing use of technologies to automate, control, and surveil students of historically marginalized communities, in contrast to more creative, humanizing, and interest-based applications of digital technologies in more affluent communities (Siyahhan & Gee, 2018 ; Pinkard et al., 2017; Srinivasan, 2018; Watkins & Cho, 2018).

Many scholars contest approaches to the digital divide that use a deficit model, treating the divide as merely a lack of access to connectivity, infrastructure, and technical knowledge, soft skills, and trainings (Baym, 2015; Noble, 2018; Srinivasan, 2018; Toyama, 2015). The deficit model ignores people’s behavior, practices, and occludes the ways in which non-dominant users can contribute to the design and development of these technologies (Srinivasan, 2018). Similarly, according to a report by Reich & Ito (2017) in the United States context, the integration of the same technology in all schools does not mean these technologies are leveraged in a progressive way pedagogically, suggesting that simply providing access to technological resources is not enough to bridge inequalities (Watkins & Cho, 2018).

The Openness Paradox

Finally, when we discuss the Openness Paradox, we offer a critique of the discourses of “openness,” “agency,” and “creative freedom” often celebrated by proponents of educational technologies. Open source platforms, free resources and apps, and public spaces that are rich with technology (e.g., Makerspaces, Code Clubs) does necessarily equate to increasingly democratized and agentic education. Of course, we recognize the potential of these ideals within democratizing pedagogical contexts in technology-rich environments, such as online platforms and makerspaces. At the same time, however, recent efforts by journalists, digital sociologists, and education

scholars have identified the ways that so-called open platforms, such as Facebook, Twitter, YouTube, and other affinity spaces, have in many cases become bastions for hate groups, science deniers, and spreaders of disinformation to gather, organize, and yes, educate one another (Gee, 2017; Noble, 2018; Vossoughi et al., 2016). Furthermore, learners benefiting from these technologies are often “affluent and highly educated” (Reich & Ito, 2017, p.3), therefore, they amplify existing norms and practices within a setting online or offline (Toyama, 2015). Existing norms and practices can include behavior of users and content presented within these technologies as artifacts and also power dynamics between people.

Critical approaches to learning environments design

Given these challenges, how can more critically grounded perspectives help to extend the work of learning scientists seeking to address questions of equity in educational technology? Participatory approaches for educational technology design that aims to address power issues could be a direction for that (e.g., Barab et al., 2007; Srinivasan, 2018). One approach, as described by Barab and colleagues, involves explicitly grounding design-based research in social agendas designed to “question and potentially disrupt existing practices and structures...even exposing inequitable power structures, resource allotment, divisions of labor, or disempowerment,” in a process they refer to as *critical design ethnography* (2007, p. 264). They illustrate this process by highlighting their work on Quest Atlantis (QA), a multi-user virtual environment designed to engage students in environmental science, statistics, formal argumentation, and other educational content through an increased sense of agency and participatory commitment. In developing and ethnographically studying this design-based intervention, the QA research team explicitly centered a more participatory view of learning meant to challenge existing structures of transactional education they saw as increasingly dominating formal educational institutions (Sfard 1998). In this way, rather than framing their interventions as ideologically “neutral,” learning scientists can develop alliances with existing movements forwarding a particular vision of social justice, be it focused on cultural responsiveness, gender equity, economic justice, or other ethical and moral commitments.

Another way forward involves drawing on the work of critical digital pedagogy as integral to the work of learning scientists in these educationally contracting times. While scholars in this field are clear that critical pedagogies, digital or otherwise, necessarily resist a prescriptive framing, it may be helpful to begin with a definition of critical pedagogy as “teaching and learning predicated on fostering agency and empowering learners (implicitly and explicitly critiquing oppressive power structures).” (Stommel, 2014, n.p.). Applying this framing to the area of educational technology, we can think of a critical digital pedagogy as an approach that centers the human acts of teaching and learning, and positions digital technologies themselves as objects and tools for critically interrogating the social realities impacting educational contexts. Practices such as “ungrading,” (Stommel, 2018) which actively reject the dominant culture of sorting, competition, and evaluation, demonstrate such a commitment.

A third approach, drawing on our own work over the past several years, invites researchers to involve learners themselves in the practice of *critical design literacies*. This approach situates design as a kind of meaning-making practice and recognizes the multiplicity of design perspectives that our participants can bring to a given space (Gee & Aguilera, in review). As with the previously discussed approaches, criticality here refers to the ways that designs and designing can be ways to interrogate social realities (as opposed to simply “solving” a problem identified by a designer) and advocate for social change. As uncomfortable as it might seem, this approach invites us to de-center our own roles as experts in the science of learning in order to create spaces for the agency of participants to shape, critique, and even transform our own designed educational interventions.

The work we have reviewed here suggests that social injustice can be perpetuated in technological systems, and that, like other education innovation designs, technologies are inextricably connected to social practices and the contexts in which they are deployed. To better understand the ways in which digital technologies shape our societies, we need to recognize how these tools mediate communication to support people in a wide range of practices such as knowledge construction and disruption of existing power structures.

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