Mediating Artifacts

Ethical, Social, and Political Dimensions of Content and Media Selection and Design

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Design Ethics   Mediating Artifacts   Educational Systems

While we usually discuss multimedia in the context of frameworks such as Mayer's theory of multimedia learning, our frameworks for multimedia lack a contextualized approach that recognize other dimensions and impacts of the work we do with mediating artifacts. Educational technology at its core centers around the introduction of mediating artifacts into learning and performance environments. Shifting from an emphasis on media (i.e., things) to mediating allows us to differently frame the work we do and the artifacts we introduce into systems, emphasizing not merely the nature of the things but the impacts of them as well.

Introduction

The nature of educational technology practice is the thoughtful and intentional introduction of mediating artifacts—in the form of images, multimedia, video, or technology applications—into learning and performance environments in service to greater educational goals. Multimedia learning is usually framed in the context of work such as Mayer's theory of multimedia learning and his related twelve principles for multi-media design (Mayer, 2008, 2020; Mayer and Fiorella, 2014; Moreno & Mayer, 1999). However, this framework and its theoretical underpinnings of information processing and memory theories (Atkinson, 1971; Baddeley, 1986, 1992, 1999; Clark & Paivio, 1991; Paivio, 1986) and cognitive load theory (Chandler & Sweller, 1991; Kalyuga et al., 1999) capture only the cognitive dimension of educational media. While these are necessary aspects to consider for learning, they do not address additional types of impacts that mediating artifacts have both on what is learned and the impact of how messages are framed in educational mediating artifacts. These impacts can include important social, political, and ethical impacts which should be considered in the work of professional instructional designers.

Shifting from an emphasis on media (i.e., things) to mediating (action served) reframes multimedia and digital artifacts that we introduce into educational and social systems to better highlight the material entanglements and local impacts of the artifacts we develop or select and introduce. This more contextualized view of mediating artifacts spotlights spaces where designers as professionals exercise both agency and values through the selection, design, and development of mediating artifacts. Professional practitioners must consider impacts of their design beyond learning outcomes, as highlighted by reports such as an Inter-agency Network for Education in Emergencies (INEE) analysis (2011) of the role of education and its artifacts in social stability and fragility across four case studies in war-torn, rebuilding nations. In this conceptual paper, we seek to extend the theoretical framing of educational media design, selection, and implementation by examining the history of mediating artifacts in the field, reframing media as mediating artifacts as a way to better understand and evaluate the ethical, social, and political impacts that our work can have beyond learning outcomes. We conclude by exploring a how reflective practice and interrogation of mediating artifacts play a role in evaluating additional impacts which can then inform selection, design, and development decisions. The decision-making on the artifacts that mediate education can mean the difference between an educational experience that is transformative to society versus one that reifies fragile or inequitable social systems.

In this conceptual paper, we use cultural-historical activity theory (CHAT) (Cole, 1999; Engeström, 1996, 1999, 2009) as a framework in combination with an existing multiple case study that spans four different countries and their cultures and histories (INEE, 2011). We selected this multiple case study because it directly addresses the social and political impacts of educational decisions and artifacts – a dimension that is not often unpacked in other studies. Together, CHAT and the cases from the INEE report help to ground our observations and discussion about instructional design practice. The authors of the paper both bring decades of instructional design practice across a range of settings as well as research interests in the embedding of ethics into instructional design practice and bringing attention to macro-issues of the impact of instructional design practice on broad social and organizational impacts. The first author also previously worked with the World Bank on the role of education in conflict or crisis. Our perspectives – both as professional practitioners who have worked in these spaces for some time as well as scholars interested in ethical and social dimensions of our work – inform our perspective and approach. We also have advanced a framework for ethics and educational technology that centers on reflection, interrogation, and design, and that work influences our perspectives on this topic as explained after the PRIME checklist (Moore & Tillberg-Webb, 2023).

Cultural historical activity theory (CHAT), which has been used as a frame of analysis by a number of educational technology and instructional design researchers to explore the activity of design (Barab et al., 2002; Yamagata-Lynch & Haudenschild, 2006; Yamagata-Lynch, 2014; Schmidt & Tawfik, 2022) is specifically well-suited for exploring design activities and the interactions between artifacts and an activity system. It provides both an approach for describing goal-directed action in which individuals (or subjects) interact with mediating artifacts as part of an activity that is guided toward a desired outcome. As a framework, it frames "activity" as situated in a socio-cultural context. That idea of instructional technology and media as situated in a socio-cultural context is central to our critique of current dominant framing for multimedia. The INEE case studies help to highlight those socio-cultural entanglements with implications for instructional design practice. As this is a conceptual paper, it is not generalizable research; rather, it is an exploration of how we can translate insights from the INEE case studies on the social, political, and ethical impacts of mediating artifacts in education into practical application using a checklist as a job aid we have developed called the PRIME checklist.

Mediating Artifacts in Cultural Historical Activity Theory (CHAT)

The idea of mediating artifacts or tools is rooted in the work of Vygotsky (Cole et al., 1978) and Leont'ev (Engeström and Miettinen, 1999), and as the framework for activity theory has emerged and evolved, some important distinctions and elaborations on how artifacts and tools mediate instruction have evolved as well. Vygotsky's focus on mediation was on internalized mediation, within an individual, believing that "that the mind emerges through interaction with the environment" (Bellamy, 1996, pp. 123-124). Vygotsky also posited that humans internalize ready-made standards and

rules but also externalize them, creating new standards and rules (Lektorsky, 1999, p. 66). Leont'ev elaborated on Vygotsky's concept of mediation, but brought in the concept of division of labor, allowing for the idea of collective activity (Engeström and Miettinen, 1999, p. 4). Cole (1999) and Engeström (1996, 1999, 2009) built on these fundamental principles of mediating artifacts when conceptualizing the framework for CHAT. Viewing the activity of educational technology practice through the lens of cultural-historical activity theory (CHAT) is a fitting tool to analyze mediating artifacts in education through their roles in the activity system, including the interconnection between the activity's parts. The rules, community, and distribution of labor that is mediated by tools and artifacts allow us to view our artifacts and media as key ingredients rather than accessories to the process. In Figure 1, the CHAT model is represented with its components.

Figure 1

CHAT model for analyzing activity systems and mediating artifacts
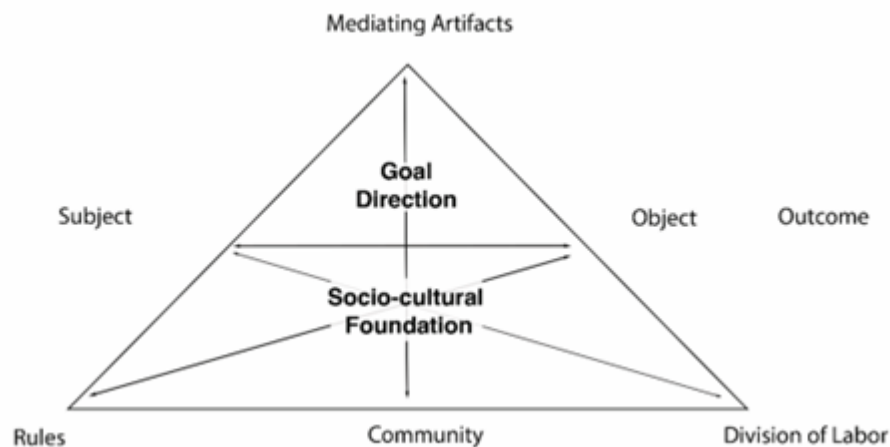
Most notable for our analysis in this paper is the role of mediating artifacts both in shaping the activity and providing a mechanism for change. CHAT also highlights how those mediating artifacts interact with rules, community, and division of labor—the socio-cultural foundation of the activity system. All of the relationships in the system are bi-directional, but conceptually, the mediating artifacts have a relationship and influence with rules, community, and division of labor. In the case of an educational activity, mediating artifacts include textbooks, technology tools, instructional materials, instructional strategies, multimedia content, assessments, and so on, although mediating artifacts are not only objects (tangible or digital) but also can be more abstract methods or tools used to mediate an activity, such as strategies and professional methods like learning objectives and the instructional design process.

Understood through the CHAT model, mediating artifacts function as catalytic elements in an activity system. They play a role in the part of the activity that assists in moving forward goal-directed action. Vygotsky (1978) described both tools and signs as mediating artifacts where signs include language and structures of language as symbolic systems that we use to communicate. His conception of mediating artifacts thus included not only machines, instruments, procedures, plans, and methods but also laws, language, semiotic structures, and texts (Kuutti, 1995; Nardi, 1996). Cole elaborated on Vygotsky's idea of mediating artifacts, suggesting classifications of primary, secondary, and tertiary mediating artifacts (Cole, 1999, p.91). Cole defined primary artifacts as tools used in production, such as, in the educational technology context, computers, and networks (Cole, 1999, p. 91). He explained secondary artifacts as "representations of both primary artifacts and the modes of action using them" (Cole, 1999, p. 91). Textbooks, videos, multimedia, and other materials used in education and learning systems would be categorized as secondary artifacts in Cole's schema, as would instructional strategies inherent in including these artifacts in instruction. Finally, Cole defined tertiary artifacts as autonomous worlds where socio-cultural conventions do not apply and as a result may require a new activity system for navigation. Cole describes tertiary artifacts as play spaces where real world rules don't apply

"color[ing] the way we see the actual world, acting as tools for changing current praxis" (1999, p. 91). All mediating artifacts – language, strategies, methods, machines, materials, laws, and so on – are working at any given time to color how actors in the system see the world and influence both the rules and navigation of those rules. And mediating artifacts themselves are influenced by the socio-cultural context of a given activity system and should be understood and analyzed within that context. Kaptelinin explains that "identifying the ways people use the artifact, the need it serves and the history of its development" (1996, p. 46) are important contextual details that help explain the creation and impacts of a given mediating artifact.

Historicity, Expansive Cycles, and Transformation

A central feature of CHAT is the concept of historicity. Historicity is the "human situation in flow where versions of the past and future (of persons, collectives or things) assume present form in relation to events, political needs, available cultural forms and emotional dispositions" (Hirsch & Stuart, 2005, p.261). This speaks to the collective development of a community represented in an activity system: what specific cultural, historical, political, and social realities are shaping the activity? These can be represented by the roles, community, and division of labor in the CHAT model, but they are also reflected in the inherent representation and interaction with the socio-historical content embedded in any mediating artifacts and in the pattern of the activity repeated over time.

From the lens of the observer, recognizing expansive cycles requires identifying larger patterns and the evolution of the activity system. Each analysis of an activity using the CHAT model is one snapshot of the activity from the perspective of one subject and one object. Within a fully analyzed activity system, there could be multiple objects, and these will change temporally, especially if the activity is sustained over a long period of time. The commonly used triangle to analyze activity is not static, and over cycles of the activity system, a new structure can emerge based on the older one. This transformation is what Engeström called an expansive cycle (Engeström 1999, p. 33). Expansive cycles are the results of the activity system moving beyond internalization (i.e., socializing novices to become competent members of the routinely conducted activity) (Engeström, 1999, p. 33). Inherent tensions in the activity system, prompting critical reflection, lead to incremental changes in the activity system over time, and as these give way to a new model for the activity, the process leads to the transformation of the activity system. This idea of transformation is a somewhat idealistic view of what is possible for an activity system. In order to reach that level of transformation, old patterns must be overwritten: "Instead of just benign achievement of mastery, development may be viewed as partially destructive rejection of the old" (Engeström, 1996, p.1). This backdrop of viewing the activity of education within the socio-cultural historical context of the nation in which it is occurring and the potential for transformation is informative as we consider multiple case studies in the next section. Within activity theory, a bias towards transformation is inherent in the activity, but of course, not all activity leads to transformation. The literature points to this tension: "Transformation is understood as changing the object. But careful examination shows that not every change is a transformation" (Davydov, 1999, p. 42). Further, how do we position the mediating artifacts in an educational system to lead toward a more transformative position? While it is not a foregone conclusion that the activity of education will lead to transformation – of individuals, of groups of people in the society, and potentially of the society as a whole – certainly a bias of educators is a belief in education as a tool of transformative change.

For educational technology and multimedia artifacts, in particular, there is a tendency to view technological innovation as progress and as full of transformative potential. Rogers (2003) termed this "innovation bias" – the view that anything new is inherently better than anything already in use. The view that innovation or change is inherently good stems from positivist views of science and technology in which science is inherently good and technology as a derivative of science is neutral (Scharff & Dusek, 2003). This leads to the conclusion that ethical, social, and political considerations of technology are not applicable (Barbour, 1993; Feenberg, 1999, 2002). Subsequent philosophies of technology such as post-modernism and meta-modernism have challenged this view of science and technology, proposing instead that contextualist views of technology more accurately reflect the role that human actors and their values and beliefs play in the design and implementation of technology and therefore in its outcomes (Barbour, 1993; Feenberg, 1999, 2002; Scharff & Dusek, 2003).

A disposition that differs from innovation bias is captured well in educational change scholarship by Ely, who states that "Neither stability nor change have any intrinsic value. The worth of stability is in the goodness it preserves, while the worth of change is in the goodness it brings about" (1976, p. 151). Media maintains an emphasis on the innovation or technology itself, while mediating asks us to query the value of the endeavor – what goodness is preserved and what goodness is brought about. In other words, change or transformation cannot be seen as inherently positive or negative —we need to fully appreciate all components of transformation in order to fully understand what is lost and what is gained from any given stakeholder's perspective. To query social, political, and ethical effects of mediating artifacts in education, we have selected an international comparative case study that challenges the bias and assumption of education as transformative progress by examining the relationship between educational systems and social fragility and stability. By walking through this comparative case study, we can see how educational artifacts are more than simply media (i.e., things) and are more accurately described as mediating.

Mediating Educational Artifacts and Social Fragility & Stability

In 2011, the Inter-Agency Network for Education in Emergencies (INEE) reviewed the role of education in countries impacted by conflict or crises. The report focused on four cases – Afghanistan, Bosnia-Herzegovina, Cambodia, and Liberia. What they found was not that education was an unmitigated good or a stabilizing presence, but rather educational decisions related to content, curriculum, and other systemic features greatly shaped the role of education in social stability or conflict. Content and technology selections could mitigate instability, but they could also just as readily contribute to social, political, and security issues, or even simply fail to play any sort of purposeful role in social outcomes.

Using a comparative case study analysis, the Inter-Agency Network for Education in Emergencies (INEE) sought to better understand the relationship between educational systems and societies impacted by conflict or crises that were leading to social instability (or "fragility"). Their focus was on the "situation of fragility" (2011, p. 12) and how various educational decisions interacted with this situation across differing contexts. They used three comparative lenses for their analysis: how education might impact domains of fragility, a spectrum of impacts that attempted to capture more variance and nuance, and then common areas of "difficult policy and programming choices" (2011, p. 13). The five domains of fragility in the framework used for their analysis included governance, security, economy, the social, and the environment. Their method of analysis highlighted how education access, curricula, textbooks, governance, and management functioned in each domain of fragility.

Across the four cases, education interacted with social stability or fragility in three ways: negatively, positively, or unintentionally. INEE described negative interactions as situations where educational curricula, textbooks and materials, governance, etc., reflected, reproduced, or reinforced factors that contributed to instability or fragility. For example, in Afghanistan and Bosnia-Herzegovina, the group found curricula and textbooks that reinforced negative stereotypes of sub-populations in the country and recounted historical events with framing that reinforced cultural divisiveness. Such curricula and textbooks enhanced mistrust, intolerance, and separate identities. We see similar examples of this playing out in the United States and other countries today as politicians in some locations are exercising more direct control and limitations over how different races and historical events are depicted in school textbooks. In such an instance, the selection of mediating artifacts that are limited and/or limiting in their representation constrains the activity system - and potentially limits the opportunity for transformation, either intentionally or unintentionally.

For positive interactions, the authors of the report described situations where educational curricula, textbooks and materials, governance, and so on helped to mitigate factors that contributed to instability or fragility. This speaks to the pivotal role that mediating artifact can play in the dynamics of the activity system. For example, in Afghanistan where girls' school attendance is opposed by influential religious groups, resulting even in schools being bombed because girls attended, educational decision makers leveraged radio-based distance education to facilitate educational access. In still other situations, educational decisions inadvertently affected social instability and fragility, in some cases representing significant missed opportunities for potential positive interactions and unintentional negative interactions. For example, in Cambodia, the expansion of educational opportunities created rising expectations that were out of step with economic realities and actual employment prospects, leading to increased frustration among graduates. Here we

see a disconnect in the activity system between the expected outcomes of graduates (employment in the area of study) and the rules, community, and division of labor in the broader social context.

Across many of these settings, donors (who could be either the "community" or part of the "division of labor" in an activity system) also contributed inadvertently to destabilization. In one case, a donor's focus on revising biased textbooks lead to heated discussions and politicization of educational reform as different groups became further entrenched in their positions. In another case, the donor's focus on specific projects led to fragmented efforts and unbalanced resourcing, creating both inefficiencies in the system and lack of ownership in initiatives. Based on their analysis of these case studies, the authors conclude:

> The impacts vary according to whether access to education is made a privilege or a right; whether curricula and textbooks are biased and divisive or objective and inclusive; and whether educational governance and management are characterized by inefficiency, incompetence, and corruption, or efficiency, high levels of capacity, and transparency (2011, p. 13).

Across all of these cases, governance, security, economy, social, and environmental characteristics for each country are central themes. These align with rules, community, and division of labor in the socio-cultural context of the activity system, but maybe aren't always directly visible or considered when we are analyzing educational systems. Given the findings in the INEE study and the considerations in this analysis, researchers in our field might consider using similar contextual information in research and reporting to more finely detail the socio-cultural context of an artifact being studied. For example, for Afghanistan, the authors describe the social domain with religious fractures that contribute to linguistic, ethnic, gender, class, and rural/urban fractures. They also note that two-thirds of the population is illiterate, and gender is a "significant battleground" in education (2011, p. 22). In the governance domain, the authors describe widespread corruption and a fragmented political sphere with (at the time) 83 different approved political parties contributing to social fracturing and fragility. In the domain of security, the authors set the context of three decades of war which led to proliferation of arms and landmines, high crime rates, abductions, and drug trafficking. Other additional major contributors to social instability included rival criminal networks and inability of the Afghan army to maintain control over the entire country. They similarly detail these domains for the other countries in their study, illuminating the conditions of stability and fragility. With context provided, the authors then detail negative and positive roles of education.

In terms of negative impacts on governance, they found that unfair and unequal allocation of educational access and outcomes reinforced conditions for instability because these inequities in allocation and resourcing reproduced historical divisions of wealth, ethnicity, and gender, failing to "challenge and shift existing power structures and power bases" (2011, p. 26). However, some positive impacts of education on governance included situations where educational leaders abolished school fees to create a more level playing field or enacted accountability measures to break habits of secrecy and enhance transparency, thereby rebuilding trust. Negative impacts on security including reproduction of violence outside of the classroom when children were regularly exposed to corporal punishment and educational artifacts that extolled violence. The authors also note that in some instances:

> Incitement to violence also occurs through the politicization of education, which is manifested in a segregated system and in biased portrayals of 'the other' in curricula and textbooks. This is generally coupled with a pedagogic approach that fails to promote critical thinking skills, thus favoring young people's manipulation and mobilization. Education thus becomes a 'battleground' where broader ethno-national divisions are played out. By being violent, divisive, and prejudicial places, educational institutions have helped to reinforce justifications for ethnic or religious conflict, and hence contribute to insecurity (2011, p. 27).

Conversely, they observed instances when education played a stabilizing role by providing a place of physical security that counters militarization and prevents youth from being conscripted. They also observed an influence of codes of conduct for teachers on physical punishment and sexual violence on reduced general violence. This description speaks to the inherent challenge of the educational system "acting" in a different manner of rules and division of labor than the

rest of the social context. If there is violence, such as corporal punishment, as part of the rules of engagement within the social system, having an educational system that aligns with the broader socio-cultural context is to be expected. The question, then, might be how to contend with this when designing education, and what role can mediating artifacts —learning materials, strategies, and frameworks – play in attempting to disrupt and create new dynamics within the activity system.

Returning to a focus specifically on mediating artifacts, the INEE researchers noted how educational technologies like various forms of distance education enabled schooling despite security challenges. Educational programs on HIV or AIDS also helped individuals living in fragile contexts better navigate food insecurity and health challenges. In Liberia, the use of distance learning such as radio-based education for civic education also helped to promote better social cohesion and security and facilitated a peaceful electoral period. They also observed instances when educational artifacts – namely textbooks and other curricular materials – were politicized and intentionally manipulated schooling to segregate and reinforce biases through portrayals of "the other," reproducing social divisions in schools that fueled conflict. However, textbooks can also promote nation-building, social cohesion, and positive values, which helps to mitigate conditions for social instability. The content and affordances of the textbooks and other educational artifacts, as well as the inherent characteristics of instructional strategies deployed to implement these mediating artifacts, can hold weight in terms of managing and contributing to potential expansive transformation of the activity system but can also as readily reify existing structures, norms, and values that perpetuate divisions and social instability.

Moving past the simplistic "positive" or "negative" characterization of these mediating artifacts, the INEE authors provide a more nuanced spectrum of the relationship between education and fragility, identifying five types of impact:

- Education actively or deliberately reinforcing and perpetuating fragility;
- Education reflecting the status quo;
- Education inadvertently favoring fragility;
- Education enabling people to live with fragility; and
- Education making inroads into fragility.

Adapting these relationships between educational mediating artifacts and social systems beyond the context of fragility, these five types of relationships may prove useful as a starting point for a framework for design, selection, and evaluation of educational artifacts.

Implications of INEE Cases for Instructional Design Practices

As illuminated by the INEE study, textbooks, curricula, and other mediating artifacts (such as distance education technologies and instructional strategies or classroom management policies) in particular have a significant historical and contemporary role as not just cognitive mediating artifacts but also as social, cultural, and political mediating artifacts. These roles that mediating artifacts play requires more careful evaluation of the ethical, social, and political effects of artifacts that are selected or designed and implemented. Textbooks, for example, are routinely subjected to politicized review, turning them into artifacts that can reify social divisions or make inroads into discrimination or foster better social cohesion.

Design features of these mediating artifacts may actively or deliberately reinforce and perpetuate harms and divisions, such as negative or stereotypical depictions of gender, race, religion, or other cultural or social differences. These features can either reinforce existing power dynamics or provide opportunity for critical reflection. They can reflect a status quo, which as we've seen with "return to normal" rhetoric can mean making curricular and technology choices that maintain inequities and access barriers. They can inadvertently favor individual or social harms or cultural divisions, such as inaccessible materials and digital environments that exclude learners. They can enable people to live with and navigate difficult situations, such as curricula and materials addressing climate change and other broader social problems. They can also make inroads, such as accessible materials that engender a philosophy of broader

access to learning and artifacts that include non-biased representations and historically or scientifically accurate depictions of events and constructs.

Translating the INEE analysis into implications for instructional design practices, we suggest critical questions that can be used in the design, selection, and evaluation of mediating artifacts. To aid in memory, we selected the mnemonic of PRIME, drawing upon language from the INEE analysis where P and R stand for Perpetuating or Reflective of status quo, I stands for Inadvertent, and M and E stand for Mitigating or Enabling, mapping to the different impacts of mediating artifacts identified by INEE. As these impacts are more of a continuum and can be difficult to distinguish in reality, the point is not so much to categorize as to prompt critical evaluation of artifacts. Table 1 summarizes PRIME descriptions and reflective questions that can be used as embedded practice to help interrogate mediating artifacts and their components. The underpinnings for this approach are based in the ethics and educational technology framework developed by us (Moore & Tillberg-Webb, 2023) that emphasizes reflection, interrogation, and ethics-as-design, and is explained further after the PRIME checklist.

PRIME Checklist for Evaluating Artifacts

The PRIME checklist (see Table 1) is a job aid drawing on INEE's findings that can be used to evaluate the ways in which artifacts/resources address (or fail to address) social inequality, and the ways in which they incorporate or critically evaluation the impact of power and privilege and/or consider multiple perspectives. Any mediating artifact might simultaneously contain features that align with any of these categories, so the goal is not to try to assign an artifact to one of these categories, but to critically evaluate the resource in ways that situate the resource in the broader social context.

Table 1

PRIME Checklist for evaluating mediating learning artifacts.

Type of Impacts	Description	Reflective questions
Perpetuating Status Quo	The creation, selection, or use of artifacts to intentionally or deliberately perpetuate biases, divisions, etc., through politicization of artifacts, targeted exclusion or marginalization, or other means.	What social harms, cultural fractures, or marginalization are being or could be perpetuated by this artifact? If the artifact has problematic components, can the artifact be contextualized to address ways in which the status quo is perpetuated?
Reflective of Status Quo	The creation, selection, or use of artifacts that reflect a status quo or intentionally maintain a status quo by "reproducing or failing to challenge existing patterns" of inequities, exclusion, etc. (INEE, 2011, p. 34).	What status quo is maintained by the artifact? Who benefits from that status quo, and who remains excluded? Are traditionally excluded voices included? How might the artifact be contextualized to include other voices?
Inadvertent impacts	"Well-intentioned but inadvertently counter-productive" artifacts (INEE, 2011, p. 34)	Could this mediating artifact contribute to further entrenchment? Does this artifact fail to reflect realities that could cause disillusionment for students? Does this artifact unintentionally exclude or marginalize any learners? Can it be modified or redesigned?
Mitigating	The creation, selection, or use of artifacts that seek to intentionally break cycles of politicization, marginalization, inequities, exclusion, etc.	What cycle does this artifact seek to break? How does this artifact seek to break a particular cycle? What instructional strategies or competencies are necessary to support the use of this artifact?

Type of Impacts	Description	Reflective questions
Enabling	The creation, selection, or use of artifacts that enable individuals' or systems' capabilities to enhance human health, well-being, and flourishing.	What individual capabilities are being enabled by this artifact? What is the particular social need or problem this artifact can help individuals navigate? What instructional strategies or competencies are necessary to support the use of this artifact? Do the media and technology support learner privacy, dignity, and security? Are the media, texts, and technology accessible and with appropriate representation? Do media and texts provide flexibility for learners and instructors to adapt to desired instructional uses?

Reflective Practice & Interrogating Technology

The PRIME checklist could be a helpful tool for practitioners in the field seeking to integrate more reflection into their design practice. Interrogating instructional design practices and artifacts is central to reframing professional ethics as a form of reflection-in-action (Moore & Tillberg-Webb, 2023; Schön, 1983; Tracey & Baaki, 2014). Schön argued that most problems professionals encounter are complex and have confused or conflicting ends. These complexities and contradictions require not just problem solving but also problem setting (1983, pp. 40-41) or what Svihla refers to as problem framing (2020). Svihla defines problem framing as a process in which a designer or decision "take[s] ownership of and iteratively define what the problem really is, decide what should be included and excluded, and decide how to proceed in solving it" (2020, para. 2). In short, the problems we solve in our work derive from how we frame the problems we are working on. If we frame considerations such as access, equity, marginalization, and other outcomes or impacts into the problems we work on, then we will devise artifacts that seek to address these in addition to learning outcomes.

In addition to problem framing, professionals also engage in reflective practices that Tracey & Baaki describe as "a series of questioning, making a decision, reflecting on the consequences of the decision, then making another move" (2014, p. 4). Additionally, critical theories of technology share a common theme of encouraging the interrogation of technologies. In the PRIME checklist, we provide possible reflective questions that can guide interrogation of mediating artifacts in education and learning design. Although we provide some example questions, the idea is that a designer or a team would adapt these or devise their own reflective questions for interrogation of artifacts, likely even adapting these on a project-by-project basis. These should be questions that help a designer or team question the artifact, reflect on consequences of it, and then adapt and revise the artifact or select something different based on reflection and interrogation. Whether a designer uses the specific questions we suggest here, the main idea is to develop questions that can be used as reflection-in-action on PRIME characteristics of a given artifact.

Ethics as Design & Tensions

The PRIME checklist, and the fact that any artifact could potentially fall across multiple categories in the checklist, highlights the tensions and complexities that are inherent in the design of artifacts. To navigate those tensions, ethics-as-design is an additional useful tool for embedding social, political, and ethical considerations into practice. In particular, it is very helpful for navigating tensions that arise in the complexities and contradictions of the problems we are aiming to address. Whitbeck (1996), who introduced the idea of "ethics as design," argued that ethics require synthesis, not merely analysis or judgment of right or wrong. She observes that many moral problems are similar to design problems in that there is rarely one unique or perfect solution; instead, there are a range of possible solutions which are stronger or weaker fits to competing or contradictory design requirements. She states, "It is not enough to be able to evaluate well-defined actions, motives, etc., because actual moral problems are not multiple-choice problems. One must devise possible courses of action as well as evaluate them" (1996, p. 9). Ethics-as-design encourages the mindset that solutions will rarely come to us in clean pre-existing packages and that often we iterate our way to improved solutions through interrogation and reflective practice. The process of design can be leveraged as a theory of action in service of devising and revising mediating artifacts that work to break cycles of politicization, marginalization, inequities, exclusion, etc., and/or enable individuals' or systems' capabilities to enhance human health, well-being, and flourishing.

The INEE report captures some tensions in decisions for which educators and educational planners must devise solutions, not simply choose between clear rights or wrong (2011). For example, expanding access to basic education appears to result frequently in emphasizing quantity over quality. When equity in education is framed as increasing access and emphasizing quantity, it can result in compromises on quality that lead to narrowing foci on things like basic literacy and numeracy at the expense of additional important topics and teacher training or preparation in these areas, such as civic education, human rights education, environmental education, drug education, and so on. A framing of equity as quantity can also lead to neglecting curriculum and textbook reform such as introducing newer topics like critical local history (e.g., genocides or race riots) and other areas where educational artifacts could play a role in broader social issues and impacts. Aspects of quality also include whether content is revised to include "a critical discussion of sensitive and controversial matters" (INEE, 2011, p. 46) or whether resistance to reforming content particularly on these topics is strong. Another tension inherent in educational artifacts is artifacts that push for national identity and enhanced social cohesion may "result in the imposition of the culture and values of dominant groups, and assimilationist practices, as well as nationalist sentiments…" (INEE, 2011, p. 55). A design challenge presented by this tension is how to balance the promotion of regional or national unity while also reflecting and respecting differences.

Examples of PRIME Applied to Educational Technology and Instructional Design

Some general examples of PRIME applied to educational mediating artifacts may be helpful. One example of Perpetuating mediating artifacts has been referenced multiple times throughout the paper already. Textbooks that are edited to depict members of particular factions, races, religions, or genders in stereotypical or demeaning ways are intentional in their marginalization. An example of artifacts that Reflect a status quo and thus maintain a status quo includes textbooks, videos, or online materials that have not been revised to facilitate critical discussions on sensitive or controversial issues. For example, presently in the United States several state leaders are requiring schools to exclude or scrub any materials with historical details or discussions on racist events such as the Tulsa Race Riot and are overtly suppressing educational materials that do discuss white supremacy and systemic biases in US social, cultural, and political structures, such as the 1619 Project (Hannah-Jones et al., 2021). These efforts reflect a deliberate attempt to maintain a particular status quo by reproducing patterns of inequities and discrimination and fails to challenge that status quo deliberately.

Proctoring software is also a newer mediating artifact in educational systems that could be classified as either Reflecting a status quo or Inadvertently counter-productive. The software reflects a bias towards light-skinned and neuro-typical students, leading to increased false rates that identify darker-skinned and neuro-atypical students as engaging in cheating behaviors. It is difficult to determine the degree of intentionality to this design flaw, but the effect of it is a reinforcement of biases and stereotypes and maintenance of status quo inequities in education nonetheless. The software does present more direct and intentional ethical issues with privacy and dignity, as the software requires a learner's environment to be entirely visible and controls learner behavior during assessment activities in a way that can jeopardize their personal autonomy and dignity. Often, the software records an individual's home environment and analyzes it based on a company's or developer's view of what is acceptable and makes a judgment of that individual. The intentionality in these design features suggests they Reflect a status quo and may even Perpetuate hidden or undisclosed biases.

An example of an inadvertent mediating artifact is any of the myriad online or distance learning environments and systems. While the intent of these (at least for designers and instructors) is to increase access to education, often many features of the system can inhibit access to online or distance learning. Accessibility features and characteristics – or lack thereof – are common examples where artifacts that may be intended to reach more learners in fact erect barriers for learners unintentionally. This issue with a given mediating artifact may be addressed through redesign of the artifacts or revisions or even through policies or other systemic incentives that induce designers, instructors, and others to turn on or engage accessibility features and practices.

An example of Mitigating artifacts would be restorative justice educational practices or revised methods such as ungrading (Blum, 2020). While we may typically think of artifacts as tangible or physical objects, in the CHAT model

mediating artifacts can also be methods and strategies used in a learning system to mediate learning. In the case of ungrading, for example, this is an intentionally re-envisioned classroom practice aimed at dismantling power imbalances in the learning environment. Finally, an example of Enabling mediating artifacts in learning environments includes the many curricula and materials that focus on helping learners develop the capability to manage or navigate difficult issues. For example, curricula and materials on mental health and well-being or climate change or agriculture or technology or digital literacy are all geared toward helping learners navigate specific social or cultural needs and conditions.

Conclusion and Next Steps

By reframing multimedia as mediating artifacts, we are centering the designer as a human present in the mediating activity rather than centering the objects that we develop or select. This shift highlights the role we as professional designers play through the decisions we make that convey particular values and messages which are not neutral but instead are social, cultural, and political in nature. As practicing professionals, our frameworks for the mediating artifacts we develop should account not only for cognitive features and learning outcomes but also the ethical, social, and political considerations and impacts as well. As Davies stated in defining educational technology, "what is 'best' is not only a technological question, but also an ethical one" (1996, p. 16). Authors like Davies called for contemplation and examination of our practices to be as common as our focus on developing technical methods. However, that has not kept pace with our development and research of things and methods (Moore & Ellsworth, 2014; Kimmons, 2020; Moore, 2021). The PRIME checklist presented here - drawing on case studies that highlight the social, political, and ethical dimensions of learning artifacts - is a contribution towards this gap. It provides a preliminary structure that can be used for design, evaluation, and use of artifacts in learning.

Although we have developed this PRIME checklist to try to structure conversations and scaffold practice by drawing on evidence derived from the INEE case studies, the framework proposed here may present limitations that are inherent in the contexts and cases selected for analysis. Further testing is warranted to validate or refine the PRIME structure. Case studies – especially multiple, comparative case studies – and ethnographies are particularly well-suited methodologies to unpacking cultural and contextual details surrounding social, political, and ethical impacts of mediating educational artifacts. Important next steps include developing a robust suite of such cases and studies to carefully and methodically validate a flexible, adaptable framework that can continue to inform professional practices.

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