Designing Technology for Learning:
How to Get from Disenfranchisement to Disinheritance and Why We Need to Go There

Zaza Kabayadondo, Smith College, zaza.kabayadondo@gmail.com

Abstract: This paper describes ruptures in design practice and designed products that manifest as an experience of design that I call *disinheritance*. Disinheritance is the relationship a learner has to a designed tool or environment that makes the learner perceive it as not designed for them, not belonging to them. Disinheritance offers new ways of combining design-based interventions with ethnography about design in a "marginalized" part of the world, and is necessarily also concerned with economics, politics and how they shape design on a global scale. Building on Vygotsky's *cultural heritage* and Marx's *alienation,* the theory of *disinheritance* sets a new programmatic agenda for learning sciences research.

What's wrong with disenfranchisement?

In order to meet the agenda for this conference—to empower learners to design their social futures as they participate in the competitive global economy—we must broaden our scope of design and of how design relates to learning theory and to design practice in globally connected arenas. This paper offers an alternative for looking at how global flows produce new relationships to design for marginalized or disenfranchised groups of learners. As a word, disenfranchisement depicts the problems of poverty, necessity, and exclusion—problems constituted in gaps of access to and quality of learning environments that are magnified across global regions. Life and work in the developing world, what is dismissed as the Global South or *global periphery*, often entails learning work-arounds rather than dismantling oppressive systems that produce inequalties. Learners in so-called disenfranchised settings are capable of creatively framing problems to generate new ways of perceiving and addressing economically-imposed constraints. Disenfranchisement is a model of deprivation that fails to get at that ease of creatively seeing through constraints, what McDermott calls "the passion and ingenuity of whole persons with thick lives" (2010, p. 144).

My theory, *disinheritance,* offers an alternative framework for understanding that ingenuity: it articulates how the disenfranchised work within broken systems and accounts for how the social periphery can function as a space for recourse. The imperative is to explore the mental models for finding such clever work-arounds, a complex cognitive function that I call *disinheritance*. *Disinheritance* embraces the ambiguity of living under social structures that are beyond one's control while still practicing ways of getting by. The theory of *disinheritance* critiques inadequate and imprecise language such as "marginalization" or "peripheral," because the language characterizes social and political relations as spatial metaphors rather than perceptions of power and exclusion that can be negotiated and reforged. *Disinheritance* takes as a starting point an understanding of agency not as an automatic human capacity but as "a process in the making" (Dijk, De Bruijn, & Gewald, 2007) that arises from the reflexivity between the social conceptions of actors and the material conditions they live in. The active process of making agency can lead us to reinterpretations of "the periphery" that deemphasize the role of place and, as a corrective, put focus on a state of disinheritance as *sensory, perceptual, and cognitive* activity that allows people to weave around or work around the systems that undervalue them. The task for the learning sciences is to apply this to the design of pedagogical interventions and learning environments.

Disinheritance: A theoretical framework

Theories of learning have explained social and political inequalities of access in learning environments using spatial metaphors. Lave and Wenger's framework of a *community of practice* (1991) has been a cornerstone of scholarly discourse on how the social milieu shapes cognitive activity. Understanding processes and pathways to learning in communities calls for a mapping of how activities are regulated and consequently placed either at the center of the community or relegated to the periphery of the community's interests, through a process of legitimization or *legitimate peripheral participation*. This framework gives the impression that movement away from the periphery is the very dynamic of learning, but for many people on the periphery the notions of *center* or of *movement* are illusory.

The community of practice model was intended to describe how locally proximate groups reproduce themselves, but learning sciences research can not continue to overlook global phenomena such as economic stratification, postcolonial histories, race, gender, and broad exclusionary discourses on technological

empowerment—global forces that intersect with the local to shape how communities think of their practice. Indeed scholarship in science and technology studies (STS) emphasizes how the design of technology and the construction of scientific protocol are heavily influenced by global flows and ruptures (Appadurai 1990; Poppi 2003). Critiques of class, gender, and race have looked at identity and subjectivity as they are shaped by discourse and challenge our perceptions of how learning empowers the learner in contemporary socioeconomic contexts. The imagery of average learner who moves toward the center by negotiating, choosing and succeeding is "a neo-liberal dream of reinvention through education" (Walkerdine, 2003). In her contribution to the scholarship on situated learning/situated cognition, feminist learning scientist, Diane Celia Hodges, describes a process of alienation that she calls *dis-identification* (Hodges, 1998). Dis-identification captures how marginalized participants in a community of practice engage with the activities of a community of practice without developing the sense of being authentic members. While Hodges documents the importance of self-doubt as a form of agency and political consciousness, this paper is more interested in developing a theory about doubt in "the system" that I attribute to *disinheritance*.

With *disinheritance*, I juxtapose two conceptions mind and activity to which a more expansive view of global participation can be applied—*cultural heritage* and *alienation*—which draw from Lev Vygotsky and from Karl Marx. From the first, *cultural heritage,* I am interested in an expansive reading of the "culture" shared by learners which accounts for the geopolitcal and economic paths of exchange by which a learning technology designed in the United States ends up being an everyday part of life in Zimbabwe. Recall that Vygotsky (1997) describes cultural artifacts as "artificial stimuli-devices", tools mediating between subject and object, whose purpose is the intellectualization of behavior. The affordance of cultural artifacts is to encode social values into how things are perceived; but also to reframe or recontextualize problems. While these artifacts might be neutral in Vygotsky's theory of mediation, they are in practice created through tense social engagements that play out differently in the United States and in Zimbabwe. In the second conception of mind and activity, *alienation*, I draw on the socioeconomic disjunctures in this interconnected global "society" that produce unequal relationships to technology and to its design. The unevenness of relationships to technologies are ruptures or failures in the ability of technology to mediate learning and experience. They represent ripe opportunities to novel methodological approaches to design.

Ruptures in design: Cultural heritage and disinheritance

The golden standard of design practice—human-centered design or design thinking—invites the user to participate in design from the phase of conception to the development of a product. Designers of learning technologies, informed by learning theories such as distributed cognition, hold as an ideal that the interface of a technological tool created to assist learning will eventually become less obvious to the user. In the purview of learning technology design, technologies scaffold how we think with them by "fading into the background," what Pea (1993) ascribes to "distributed intelligence." The ideal is for technologies to become invisible or quiet mediators of cognitive transactions, yet in settings like Zimbabwe's economic crisis and other contexts in which the global poor learn to make-do, the technology, infrastructure, tools and artifacts that mediate activity are conspicuously visible because they fall in a critical state of dysfunction or disrepair. Global paths of distribution and the economic alienation of many local contexts from the source of a technology mean that protocols for specialized repair and planned obsolescence (*intentional* design features) are shaping the state of disrepair of technologies that learners encounter.

Disinheritance focuses on the materiality produced by global economic conditions that can be seen as a sheen or patina on designed things. When two classrooms—one in the United States and the other in Zimbabwe—are equipped with desktop computers, different experiences of design manifest because one classroom has funding for equipment updates and the other does not. The classroom with equipment that is allowed to fall into disrepair is a classroom with disinheritance. Where a flicker of the lights in a setting like the United States might be a noticeable but trivial anomaly, in Zimbabwe it would be a constant reminder of the collapsing economy and of failures of the nation-state to deliver infrastructure such as electricity. For the disinherited, the patina of everyday objects often becomes a corollary for the relationship the user has to the social hierarchies and access to participation in the global economy. The disconnect between the design process and the experience of the designed environment illuminates why unforeseen uses, the misuses and the dis-uses surprise designers even after human-centered design.

Disinheritance, then, is the process of leveraging as "cultural artifacts" alternative meanings that are generated through disconnections, disruptions and dysfunction (noise artifacts). In the section that follows, I discuss how learning sciences research methods can be created to capture disconnections in how designers and learners conceive of design. I outline how the theory of disinheritance informs pedagogical interventions, serves as a guide for the design of learning activities, and combines cross-sectional approaches to inquiry on learning.

From disinheritance to novel methods

A commitment to the critique inherent in disinheritance lends itself to methods that challenge assumptions about authorship in research and the final product of design-based research. The novelty in this approach to relating the theory to the methods is that the participants are the source of theorization, they are invited to do the analytical work and by doing so often break out of the dominant narrative about what learning needs a technology has been designed to address. In this section I outline my methodological approach to inviting users to design and allowing them to learn about and critique design thinking. The methods also invite learners to theorize about the learning challenges they face themselves. This is a double design intervention where a pedagogical change is introduced in an iterative manner and where the intervention equips the learners with skills that can empower them to design for themselves. This second act of the design-based intervention resembles Freirean talking circles because–it captures experience in the words of those experiencing it.

In two studies, I invited 33 Zimbabwean medical professionals to design technologies that can address a complex problem with social dynamics: the challenge of infant nourishment for HIV-positive mothers (Study 1); and the morning commute using informal transportation (Study 2). In both studies, participants were analyzing how technologies affect the livelihoods of those around them, exploring the social implications of technologies, and collaborating on creating new technologies that they see as social interventions. Both studies were set in Zimbabwe where the dysfunction, breakdown, and disorder of technologies and infrastructure are especially conspicuous and where these ruptures evoke a particularly vibrant material experience. The studies began with workshops where the participants worked in interdisciplinary design teams. They learned about design thinking process, and the value of storytelling and user-engagement in framing problems. The goal was for workshop participants to unpack how conceptions of the world coalesce around the broken, and dysfunctional technologies at the center of the two case studies. This objective called for dialogue with participants about their take on citizenship, modes of living, and how technologies shape their subjectivity. I augmented these personal narratives with rich ethnographic data and design-based research about transportation and infant care in Zimbabwe.

In Study 1 (Kabayadondo 2015), participants were prompted to create a prototype that would allow them to think about their invention in a structured way while also revealing the processes and conceptual blocks they encountered. I trace how the activity of prototyping helped the participant teams determine which design features must be built into their invention. I analysed the talk shaped around the prototype: the bids that participants made to their colleagues, the scaffolded thinking that they applied to the device, and how the content of their discussion was shaped by hopes (and pessimism) that innovation could ease the material conditions of the Zimbabwean crisis.

Study 2 outlined the disinheritance framework by focusing on the kombi, a large passenger vehicle appropriated in informal or illicit transportation for those unserved by formal bus services—kombis account for over half of the world's public transportation trips everyday (Cervero & Golub, 2007). Traditionally, large surveys, participant observation, and interviews have been used to understand informal transport. Taking a cognitive approach enriched the discourse on informality with accounts of the role the technology of the vehicle plays in shaping conceptions of the everyday. In their talking circles, the participants unearthed a spectrum of conflicting but co-existing realities for kombi passengers. They discussed the ambiguity of statuses such as "victim" or "beneficiary," opening up the possibility for passengers to simultaneously have agency and be vulnerable. As they constructed their model of the disinheritance created by the kombi, the participants flashed back and forth between multiple subjective stances, of themselves, of the partners they are designing with, and of the learners they are designing for. This ability to flash between subjective stances was a product of a fluid perception or *perceptual agency*, what Monson (2008) describes as the ability of musicians, for example, to lace in and out of hearing features in a complex musical composition. The combination of design and theorization revealed how learners construct agency out of ruptures and was methodologically lucrative for explaining how what on the surface appears to be disenfranchisement produces clever workarounds and ingenuity.

A new agenda for learning sciences

Learning sciences research has taken on the imperative to empower learners to go about learning through designing tools and environments that make that learning happen more smoothly or efficiently. As learning scientists who care about design, we are focused on technology that fades into the background. The reality is, however, that social conditions often lead to design being misused or disused—it is foregrounded in new forms of usability that provoke a rethinking of how learners relate to design. We need to understand that a cognitive process is going on when these new forms of usability arise. Learning technology tools are designed for their functionality, in a design process that seldom takes into account dysfunction, misuse, disrepair as sites for learning. The theory of disinheritance tries to capture how cognitive, sensuous, and perceptual responses to the dysfunction of technology lead to learning. The theory of disinheritance examines the learning that takes place

when the technology remains in the foreground. Disinheritance privileges the sensuous or perceptual experience of technology as it fails, surprises, misfires. The implications of taking design thinking to groups that don't get to participate in design process are that by allowing learners to learn about design and through design, we empower them to re-author theory about learning from their experience of what it is like to learn. In my reading, this is the next frontier of learning sciences research. If we are to reset the agenda for learning sciences research we are to do so by acknowledging the role, anticipating even, the consequences of disinheritance.

References

Appadurai, A. (1990). Disjuncture and difference in the global cultural economy. *Public Culture, 2*(2), 1-24.

Cervero, R., & Golub, A. (2007). Informal transport: A global perspective. *Transport Policy*, 14, 445–457.

Hodges, D.C. (1998). Participation as dis-identification with/in a community of practice. *Mind, Culture, and Activity: An International Journal*, 5(4), 272-290.

Kabayadondo, Z. (2015). The Prototyping Mind: Rethinking Perception, Affordances and Mediation of Cultural Artifacts. *Mind, Culture, and Activity: An International Journal, (21)*1: 1-21.

Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation* (Learning in Doing: Social, Cognitive and Computational Perspectives). Cambridge: Cambridge University Press.

McDermott, R. (2010). The passion of learning in tight circumstances: Toward a political economy of the mind. *Yearbook of the National Society for the Study of Education, 109*(1), 144-159.

Monson, I. (2008). Hearing, seeing and perceptual agency. *Critical Inquiry, 34*(S2), s36-58.

Pea, R. (1993). Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations*, (pp. 47-87). New York, NY: Cambridge University Press.

Poppi, C. (2003). African art and globalisation: On whose terms the question? *Engage: Globalisation, 13*, 1-9.

Van Dijk, R., De Bruijn, M. and Gewald, J. (2007). Social and historical trajectories of agency in Africa: An introduction. (Eds.). *Strength beyond structure: Social and historical trajectories of agency in Africa*. (pp. 1-15). Leiden: Brill.

Vygotsky, L. S. (1997). *The collected works of L. S. Vygotsky. Vol. 4: The history of the development of higher mental functions*. New York, NY: Plenum.

Walkerdine, V. (2003) Reclassifying Upward Mobility: Femininity and the Neo-Liberal Subject. *Gender and Education*, 15(3), 237-248.

Acknowledgments