Applying Critical Reflection to Reimagine Global Health

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Abstract

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Global health structures are steeped in power asymmetries, where much of the funding, leadership, and evidence-based interventions originate in the global north. Despite increasing calls for adopting reflexivity to critique existing approaches, few interventions exist to help global health practitioners engage in critical reflection. This dissertation leverages scholarship from the fields of Human-Computer Interaction (HCI), Feminist Theory, and Critical Technology Studies to inform the design of an interactive technology called the *(re)imaginator* that guides global health practitioners in reflective practices. HCI's emphasis on critical reflection and its extensive research on designing for reflection offers global health important evidence, and it can guide global health in building mechanisms to interrogate the current practices, explore alternatives, and reimagine interventions.

This research investigates *how* critical reflection can be leveraged to reimagine global health by answering three questions. First, it examines how design for reflection literature from Human-Computer Interaction (HCI) can inform the development of an intervention for global health practitioners (RQ1) and then utilizes this evidence to build a prototype reflection tool called *(re)imaginator*. Second, it explores how practitioners engage with and

perceive this tool (RQ2), and, third, gauges the extent to which *(re)imaginator* provokes global health practitioners to rethink and reimagine their work (RQ3).

One key contribution of this dissertation is weaving Feminist Theory, particularly Patricia Hill Collins' *Matrix of Domination* framework, into the design of the intervention. These theories ground this tool so that it can be used by a diverse set of global health practitioners—from health project designers to implementers to evaluators to funders—to provoke critiques across this interdisciplinary field. This dissertation demonstrates that critical reflection interventions like *(re)imaginator* support global health practitioners to think about their work in new ways and commit to take more equitable actions. It also demonstrates that these interventions help participants see that their colleagues question their beliefs, suggesting that reflection interventions can support practitioners in recognizing the shared appetite for changing thinking and practices across their organizations. Insights from this study can also inform the design of future reflection tools to more effectively encourage sustained critical thinking and behavior change. Critical reflection tools offer new pathways for practitioners to unpack their own contributions, recognize ways their work reinforces the field's inequities, and begin to identify changes to their practice that can help shift the course of global health.

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Table of Contents

Key terms and ideas

Critical reflection: "…bringing unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice. This critical reflection is crucial to both individual freedom and our quality of life in society as a whole, since without it, we unthinkingly adopt attitudes, practices, values, and identities we can not consciously espouse. …Unconsciously held assumptions are not things we rationally know; they are part of our very identity and the ways we experience the world. Similarly, critical reflection does not just provide new facts; it opens opportunities to experience the world and oneself in a fundamentally different way" [154].

Decolonizing the field of global health: points to disrupting power imbalances as a requirement to improve the health of populations and achieve health equity [2]. Reimagining global health means acknowledging "white supremacy, racism, sexism, and capitalism as the underlying colonial foundations of the global health industry" [34]. It means also dissecting the "ingrained systems of dominance in power…whether this occurs *between* countries, including between previously colonising and plundered nations, and *within* countries, for example the privileging of… research-based knowledge formation over the lived experience of people themselves" [86]. (Chapter 1.1 for a deeper discussion).

Epistemology / epistemic: branch of philosophy concerned with the nature, origin, and limits of human knowledge. These ideas shake "knowledge" at its core by asking questions like: what does it mean to "know" something? What do we classify as "knowledge" and why? What are the different ways we make sense of the world? Why are some ideas dominant and others marginalized? More recently, global health scholars have begun advocating for "**epistemic disobedience**" as a key ingredient for changing the field, noting the impact of the "coloniality of knowledge production" [121] on the field as a call to embolden scholars from the Global South to advocate for their ideas and perspectives [4, 5, 21, 121].

Human Computer Interaction (HCI) is a multidisciplinary field that focuses on the design and evaluation of technology, specifically on the interaction between humans and computers.

Positionality: describes a person's background, experiences, and social identities (e.g., race, gender, class, profession) that influence their understanding of the world and interactions with others (i.e. research participants, patients, colleagues, community members, government officials). Interrogating personal identities should reveal relative "histories and privileges where privilege is inherited by way of personal identity and history" [121]. Where 'privileged' people means "those who benefited, over generations from current dominant systems. Privilege is legacy-bound. A person's privileged status must be assessed according to their relative access their ancestors and descendants had to the same resources. Privilege is not attained in the course of a single lifetime. It is a social benefit developed and inherited over generations" [121].

Power: There are many definitions and debates around how to define power in global health [30]. In this dissertation I rely on Global Health 50/50's definition of power as: "The ability to influence and control material, human, intellectual, and financial resources to achieve a desired outcome. Power is dynamic, played out in social, economic, and political relations between individuals and groups" [66]. I also appreciate Rochelle Burgess' notion that every global health practitioner has power. In her book *Rethinking Global Health: Frameworks of Power*, Burchess states, " [P]ower is about the *law*; no, it's about the *patriarchy*; no, it's about

economic and financial and resources; no, it's about *ideas*. Power is loud; no, it is quiet and invisible; it is never conceded without demand; it's available to us all" [30].

(re)imaginator is the interactive intervention used in this dissertation to understand reflection practices in global health. It was designed to facilitate reflective practices specifically among global health practitioners. Informed by Human-Computer Interaction, Feminist Theory, and Critical Technology Studies, this tool aims to stimulate transformative learning and inspire new approaches to global health practice. It is the intervention we test in this dissertation. You can try the intervention at https://reimaginator.org/

Reflexivity: describes how positionality impacts relationships, processes, and outputs [121]. It asks people to "self-reflect and understand their own possible biases, their role in power relations, and how these factors might manifest in their work" [97]. The goal of this practice lies in questioning one's taken-for-granted perspectives and exploring opportunities for growth.

Reflection: describes the act of exploring one's reflexivity with the goal of gaining insights on one's biases and assumptions to provoke pursuit of new perspectives and actions.

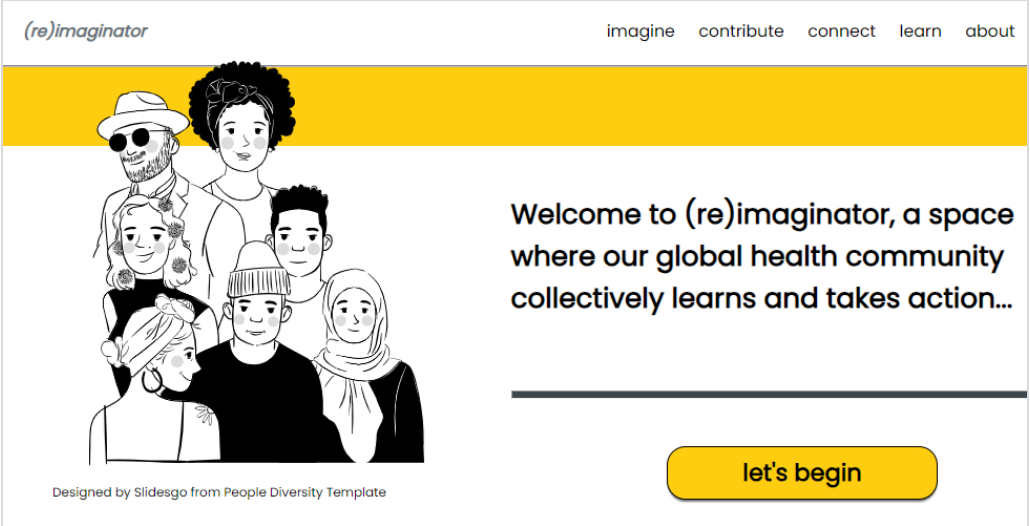
Transformative learning: This term was developed by Kathleen King based on Jack Mezirow's, an American sociologist, ten stages of perspective transformation. As King describes, " [T]ransformative learning refers to the process by which we transform our taken-for-granted frames of reference in order to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more truth or justified to guide action" [112].

1 | Introduction

> To decolonise global health is to **remove all forms of supremacy within all spaces of global health practice, within countries, between countries, and at the global level.** Supremacy is not restricted to white supremacy or male domination. It concerns what happens not only ***between*** **people from high-income countries (HICs) and low- and middle-income countries (LMICs)** but also what happens **between groups and individuals *within* HICs and within LMICs. Supremacy is there, glaringly, in how global health organizations operate**, who runs them, where they are located, who holds the purse strings, who sets the agenda, and whose views, histories, and knowledge are taken seriously. **Supremacy is seen in persisting disregard for local and Indigenous knowledge**, pretense of knowledge, refusal to learn from places and people too often deemed "inferior", and failure to see that there are many ways of being and doing. … Will global health survive its decolonisation? Perhaps. **But only if its practitioners commit to its true transformation.** - Seye Abimbola and Madhu Pai [6], emphasis my own

Global health is an interdisciplinary field that addresses health issues with global impact, including disease prevention, health system strengthening, and socioeconomic determinants of health. Global health's colonial roots lie in its origins as the field of "tropical medicine," which centered on protecting colonists from diseases in newly colonized territories and ensuring enslaved human beings could continue building colonists' wealth [66]. This exploitation laid the groundwork for the power differentials and inequities that persist today. Not only were resources extracted from the Global South to consolidate wealth in the Global North, but this period in history entrenched a paradigm where the Global North controlled and provided health care to protect their economic interests rather than as a moral imperative for our collective humanity. These significant power imbalances remain [2, 6], where much of the decision-making, funding, leadership, and evidence-based interventions in the field of global health originate in the global north [2, 33, 60, 66, 143]. These disparities are further perpetuated through inequitable allocation of funds [66], data ownership [69, 123], authorship [3, 21, 117], and explicit racism [92]. Recently, there have been an increasing number of critiques leveled at global health practices and organizations [6, 79, 126], specifically how the legacy of colonial relationships get re-inscribed throughout implementation and research projects. Decolonizing global health requires dismantling oppressive systems [126, 143], where imagination may offer global health practitioners a path to interrogate dominant paradigms and uncover fresh approaches. This dissertation describes how the fields of Human-Computer Interaction (HCI), Feminist Theory, and Critical Technology Studies inform the design and research of a new, interactive intervention called the *(re)imaginator* (Figure 1-1), a tool that guides global health practitioners in reflective practices with the goal of stoking transformative learning [112] and reimagining global health practice.

Figure 1-1. Homepage of the (re)imaginator.org website



Global health practitioners often work across many borders and cultures, carrying with them epistemologies and professional practices that influence their work. The field's approach echoes this history with "global health partnerships that aim to 'help' with members of high-income countries being given greater opportunities (mentorship, employment opportunities, leadership positions, compensation) in low- and middle-income countries than the other way around" [79]. Commonly held professional titles include "Technical Expert," "Technical Advisor," "Principal Investigator," or "Subject Matter Expert," – titles which elevate the opinions and contributions of some practitioners over others. Western-based organizations often give these titles to the personnel they "deploy into the field," a phrase with militaristic connotations that obscures the idea of working alongside communities with rich histories, cultures, and nuanced priorities. In practice, these asymmetries play out in the lifecycle of global health work, from determining what problems are worth solving, how funding decisions are made, where funding flows, who is hired, and whose work is considered research or innovative. Here, who is included as "experts" has a dramatic impact on the field, where people with lived experience, communities "served," and local innovations are rarely incorporated into practices. These limitations on what is considered "knowledge" undermine progress, perpetuate the status quo, and continue to echo global health's problematic history. While there is an increasing recognition of the *need* to decolonize the field [2, 6, 86], there are limited approaches for *how* to turn this "rhetoric into reforms" [86].

The field of Human-Computer Interaction (HCI) also has an expanding movement to interrogate its power asymmetries [12, 41, 59, 73, 144] and provides both methods and theories for how to disrupt hegemonic systems, including in the health sector. The emphasis on reflection in HCI has led to movements like "Tech Won't Build it" [83, 174], communities like the Design Justice Network [48], extensive critiques of the societal impacts of technology [16, 159], and the Algorithmic Justice League [11] which addresses more equitable artificial intelligence [29]. Both HCI and global health are currently grappling with the power imbalances of their intellectual traditions and promoting more pluralistic, inclusive, and equitable approaches [21, 59]. HCI has emphasized using *critical reflection*—examining one's experiences and exploring alternatives [154]—to support reshaping these power inequities. HCI not only offers theories and empirical studies on the importance of critical reflection, but it also examines how interactive systems can support reflection practices [15, 18, 61, 114]. A range

of research in HCI demonstrates that reflective practices can spark practitioners to examine their vantage points and intentionally open spaces for both new voices and ideas to be incorporated into practice. In other words, critical reflection offers a mechanism to question taken-for-granted perspectives and ultimately disrupt the status quo by provoking change.

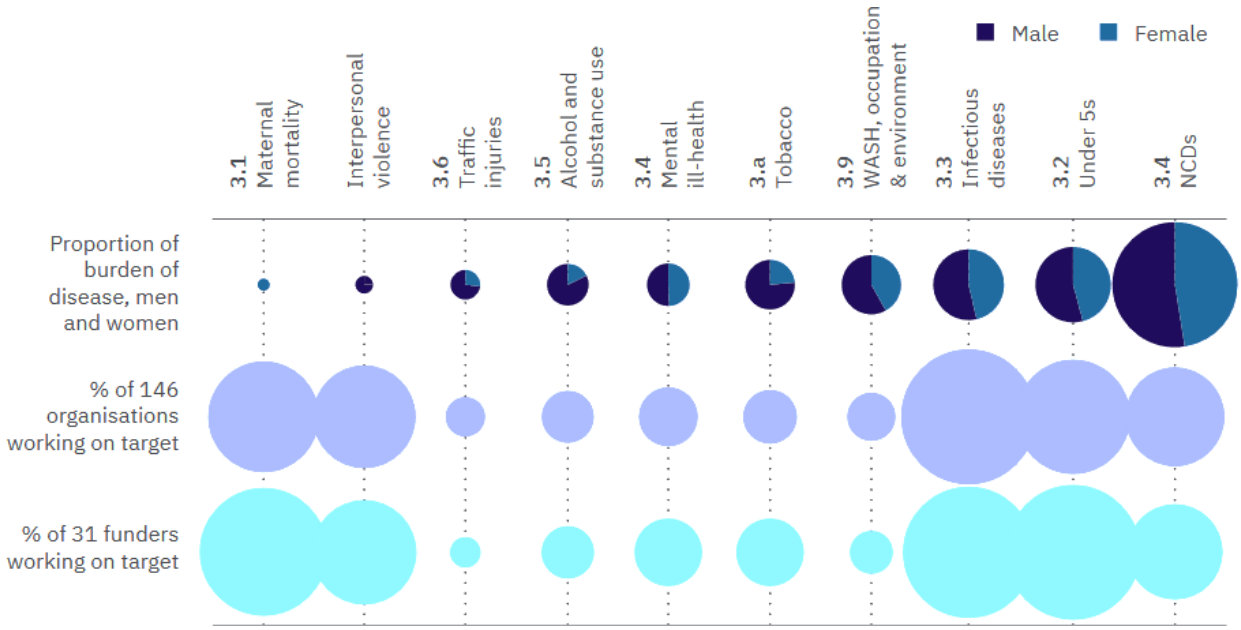
While there have been several academics calling for global health to adopt reflexivity [33, 99, 117, 148, 150, 160], there is to date a lack of interventions to guide practitioners in reflective processes. Meanwhile, the field of HCI offers both theories and empirical studies that illuminate both the importance of critical reflection and how interactive systems can support reflection [15, 18, 61, 114, 154]. This dissertation hypothesizes that using critical reflexive practices can support global health practitioners illuminate power imbalances and their role in perpetuating the status quo, and it uses approaches from the field of HCI to demonstrate how such work can occur.

1.1 A brief overview of global health's power asymmetries and the movement to decolonize

Global health was born out of the need to solve tropical diseases, primarily malaria, which was an obstacle to colonization and wealth extraction [28]. Colonizers subjected enslaved people to brutal experimentation where they tested medicines and procedures that built medical knowledge on a foundation of human suffering. The contemporary extension of these inequities can be seen in the rise of philanthropic foundations linked to tax breaks for the wealthy, where the wealthy established non-profit organizations allowing them to direct funds towards causes they favored [106, 137]. Over time, a narrative emerged portraying wealthy individuals (and their foundations) as generous benefactors. However, Global Justice Now exposes how resource extraction from the African continent continues to outweigh the amount of aid returning to the continent [44, 109]. This is not meant to shame individual giving or government spending towards global health initiatives; but rather, to highlight the underlying motivations and historical context of "aid" is, in many ways, aimed to protect wealth. The wealth accrual and extraction examples are evidence of ongoing power asymmetries, which overall are well articulated in the field of global health [2, 4, 9, 20, 33, 55, 60, 66, 79, 121, 143], with the field defining and measuring *power* in many ways [30]. Power in this dissertation relies on the definition from the *Global Health 50/50* report, "the ability to influence and control material, human, intellectual and financial resources to achieve a desired outcome. Power is dynamic, played out in social, economic, and political relations between individuals and groups" [66].

One major manifestation of these unequal power dynamics is in health agenda priority-setting [66, 106, 121, 137]. Funders often dictate health program priorities, which may not align with the actual health needs of local populations, government objectives, or the true burden of disease. To illustrate this disconnect, the *Global Health 50/50* report on power, privilege, and priorities in global health offers ample examples of how these connections play out in establishing health priorities [66]. Figure 1.1-1 taken from this report shows the mismatch between organizational focus areas (size of the middle purple circles), funder priorities (lightest hued circles at the bottom) and the global burden of disease, as defined by the Sustainable Development Goals, at the top [164]. While non-communicable diseases (like hypertension), shown in column 3.4 make up a considerable burden of disease, few of the top global health organizations have chronic care interventions.

Figure 1.1-1. Comparison of size of the global burden of disease (top row of circles), organizational focus (middle row), funder priorities (bottom row) [66]



Funder control over priorities has also led to more project-based funding centered on specific diseases, rather than aligning with the 1978 Alma-Ata declaration of focusing on primary care infrastructure. As community health psychologist and Associate Professor in Global Health Rochelle Burgess describes:

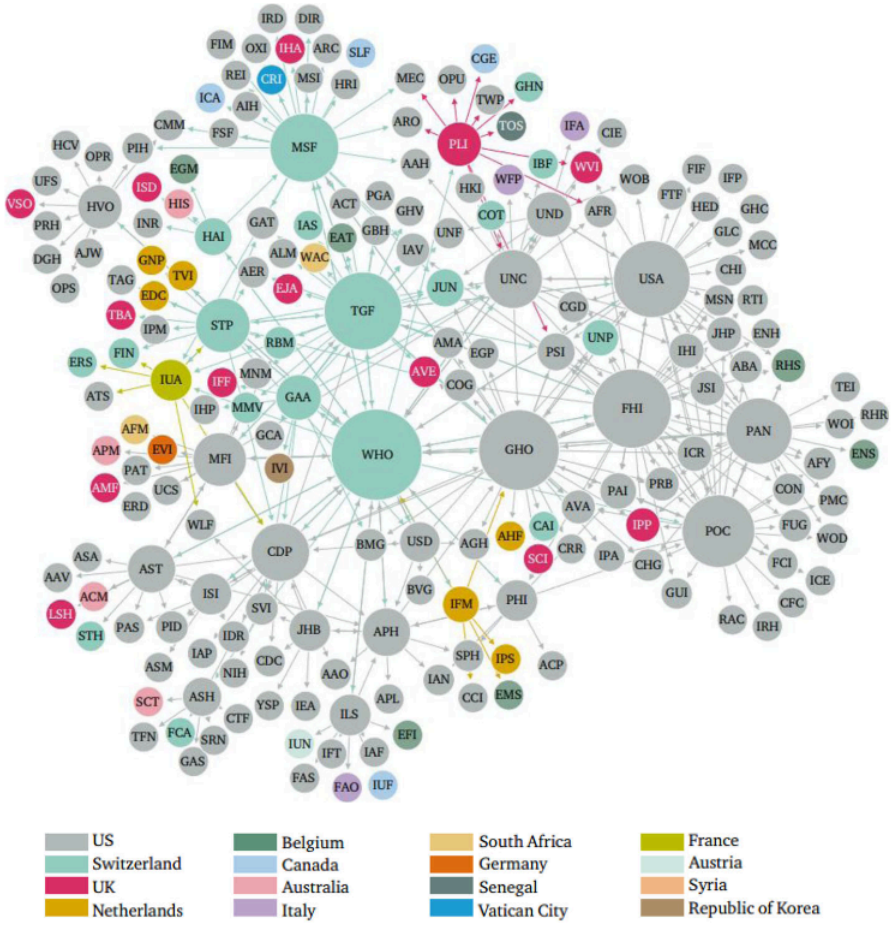
> Alma Ata and its 134 signatories were called to build opportunities for communities to build health enabling environments as part of eradicating illness. Almost immediately, powerful countries funded activities totally counter to these principles—choosing instead to focus on single diseases. This 'selective' primary healthcare was a hunt for magic bullet cures linked to technological advances owned by rich countries. More than forty years later, we are still on a quest for 'health for all,' working our way through ongoing waves of crisis, which can at times feel seemingly impossible to overcome in the absence of truly radical change. This is a clear example of the reality of working in the wake in global health; our efforts to change health are hindered by the power of the few. And the longstanding hesitancy to acknowledge the worst of this 'wake' means it will likely always be with us. [31]

Global health is "propelled by a series of projects responding to funding calls, which break the complexity of peoples' daily lives into 'manageable bits,' and 'meaningful outcomes.' This simplification means that, after millions of projects and billions of dollars, gains can quickly dissipate" [31]. Power asymmetries are detectable in many ways, including:

- More than 98% of international global health entities are headquartered in high-income countries [76] (Figure 1.1-2)
- 17% of CEOs and board chairs of health organizations are nationals of low- and middle-income countries (LMICs), though these countries are home for 83% of the world's population [66]

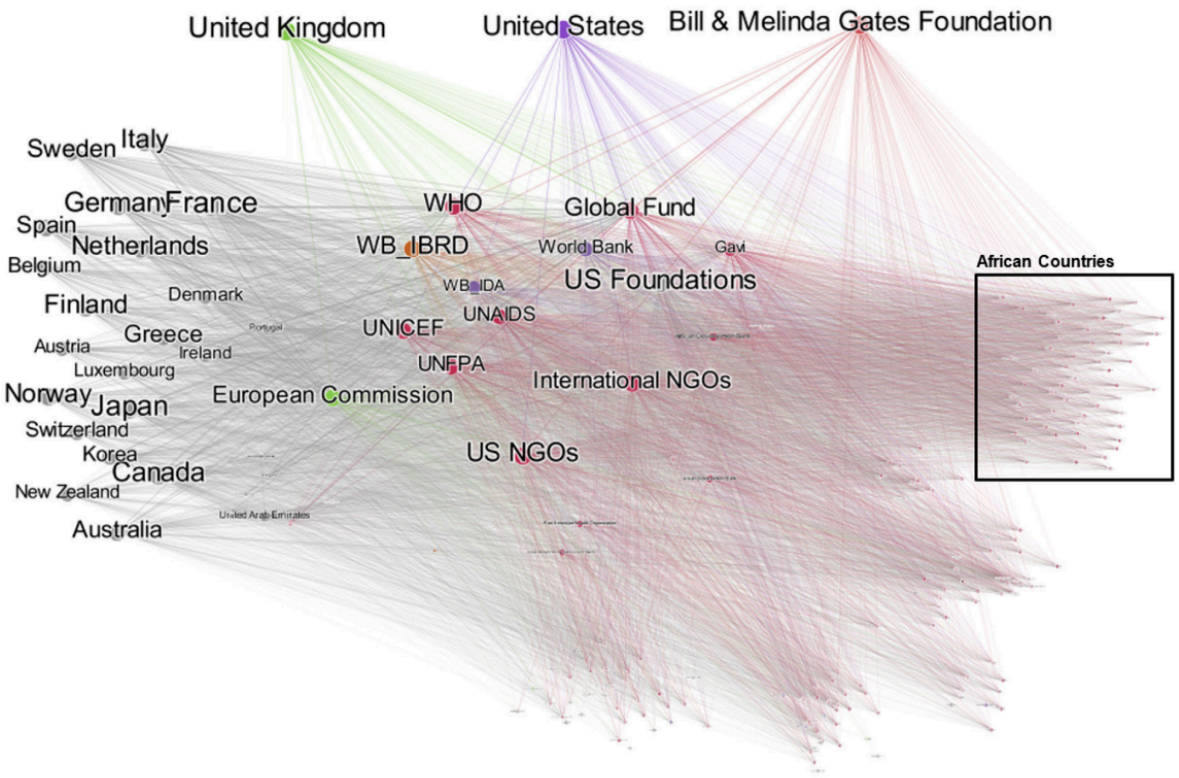
- Inequitable research practices and unfair knowledge practices [4] dominate the field, for example: only 23% of first authors on health-related topics from Sub-Saharan Africa were from the country where the research focused [74, 128] and disparities in who edits and sits on the boards of medical journals remains [22, 43, 119, 128]

Figure 1.1-2. Network mapping of 203 key global health actors by headquarters location (color). Node size is ranked by degree (or connectedness to other actors in the network) [76]



There has also been research into how to measure funding distribution [2, 20, 76, 168]. Gian Franco Bermudez and Jennifer Prah's recent work using Twitter data to model how global health priorities are set is a particularly vivid example [20]. They collected over 75,000 tweets from 20 "key" global health actors (based on three mixed-methods studies) between 2016 and 2020. Their analysis suggests that funding organizations hold a disproportionate amount of power that significantly influences global health priority-setting. Their network analysis diagram below (Figure 1.1-3) illustrates top-down flow of resources from the three top funders (the UK, the US, and Bill and Melinda Gates Foundation). It shows the web of how money flows to both non-governmental organizations (NGOs) and to African countries afterward [20, 49]. Recipients along this chain must align with funding requirements and often pass through so many pockets that funding may only trickle down to the most vulnerable people "served" by this system.

Figure 1.1-3. Funding movement between key health actors, where "line thickness represents the amount of funding for health that was transferred between two actors. Font size represents the total amount of funding for health donated or received in 2019" *[20]*



The debate on how to address and rectify these power asymmetries is ongoing [2, 34]. Some scholars talk about reforming the field, while others reject this notion and encourage reimagining [34]. In my mind, this echoes how we Americans have debated rethinking public safety in the wake of police murdering both George Floyd and Briana Taylor—with the calls for defunding (as a mechanism to force reimagining) pitted against reforming current institutions. There have also been critiques by other scholars that the reforming vs. reimagining debate in global health is forcing a silly dichotomy, where the true approach may rely on both [91].

Regarding decolonizing the field, there is an important critique of the inappropriate use of decolonization. Anthropologist and public health professional Daniel Krugman argues that global health stakeholders are overusing this term, almost using it as a brand that does harm through lip service and superficial engagement. He sees the term decolonization is being decoupled from decolonial theory, calling this the elite capture of the word [91]. As he elaborates, this "diluting of 'decolonization' into a depoliticized vision of reforming the inherently colonial and capitalistic institutions and organizations of Global Health is an example of 'elite capture'—the co-opting and reconfiguration of radical, liberatory theories and concepts then used by elites for their own gain" [91]. True decolonization requires disruption of current structures through inviting and pursuing radical change.

The unequal power dynamics in global health manifest in myriad forms, requiring meticulous effort to make these inequities visible. Yet, as eloquently stated by Rochell Burgess in her book *Rethinking Global Health: Frameworks of Power*, individuals still have agency.

> Power is about the *law*; no, it's about the *patriarchy*; no, it's about *economic and financial and resources;* no, it's about *ideas*. Power is loud; no, it is quiet and invisible; it is never conceded without demand; it's available to us all. [30]

Central to this dissertation is the argument that "decolonizing the field of global health" entails disrupting all forms of power imbalance to improve population health outcomes [86]. Reimagining global health requires both individual "acknowledgement of white supremacy, racism, sexism, and capitalism as the underlying colonial foundations of the global health industry" [34]. It also demands a critical examination of the "ingrained systems of dominance in power…whether this occurs between countries, including between previously colonising and plundered nations, and within countries, for example the privileging of… research-based knowledge formation over the lived experience of people themselves" [86]. Yet, as Burgess emphasizes, rectifying these asymmetries hinges on individuals exercising their agency and exerting their power through choices that reimagine the field. This interplay between systemic change and individual action forms a cornerstone of this dissertation.

Decolonizing means shifting power to country leadership (governing bodies, local institutions) who make decisions about how to allocate funding, set priorities, and implement health programs; it also means decentralizing power within countries. By empowering local health systems, countries can better address the unique needs and contexts of different populations. This approach recognizes heterogeneity of populations *yet* also promotes the idea of integrating local knowledge and practices to create more patient-centric and population-responsive prevention and care. Shifting power can also foster innovation, empower those with lived experience, and increase community ownership and participation in health initiatives. Ultimately, decolonization is about ensuring that health systems are responsive to and reflective of the people they serve. Improving the health of populations—to link these ideas to Dr. Seye Abimbola's recent work—means recognizing the legacy of 'unfair knowledge practices' [4] within global health *and* incorporating the 'dignity' of other knowledge systems into practice as a mechanism for health justice [5].

1.2 Evolution of this dissertation topic

1.2-1 Reflexivity and positionality

This dissertation idea emerged as I—a white, female, multi-generational American epidemiologist with a decade of experience supporting health data systems in rural Malawi, remote Liberia and across the United States—became steeped in the fields of Human-Computer Interaction (HCI), Feminist Theory, and Critical Technology Studies during graduate studies in the Human Centered Design and Engineering program at the University of Washington [54]. This is a mouthful, so let me start from the beginning and how these layers came to be.

My history: I grew up in the 1980s and 90s, in the suburbs of St. Paul, as the AIDS epidemic and its impacts were front page news. As I attended a private middle school, I vividly remember pasting news articles about Africa's

HIV epidemic into a journal, horrified by health inequities and fueling a desire to help. Three weeks into my freshman year of college, the 9-11 attacks prompted me to pursue a comparative religion degree alongside pre-medical courses. I was exposed to liberation theology, introduced to similarities and differences across religious traditions, and provoked to write my thesis comparing Western Medicine to Hmong Shamanic Traditions. My passion to become an infectious disease doctor grew from these experiences and directly during my time at Children's National Medical Center. I worked in inner-city Washington, D.C., serving a predominantly Black patient population impacted by the long-term consequences of socioeconomic disparities, including limited generational wealth and poor health outcomes. Many of the patients and their families had lived in the area for years, but due to rapid gentrification they were relocating to the suburbs and losing long-standing community ties. Here my world was rocked when I learned about the science of Adverse Childhood Experiences (ACEs) [23, 40, 52]—where there is a dose-response relationship between exposure to “adverse experiences''—like neglect, food insecurity, inhumane living conditions—and physical and mental health issues. Socioeconomic disparities induce such a deep stress response in children that it impacts their health for the rest of their lives. I also learned about the work of Dr. Nadine Burke who integrated ACEs measurement into her pediatric practice to better identify how to connect families to the resources they needed, without blaming or shaming them [163]. This work directly improved health to break the cycles of generational trauma [23, 40, 52].

My turning point towards global health came when I read the book *Mountains Beyond Mountains* [87] detailing the work of Dr. Paul Farmer, Ophelia Dahl and the evolution of Partners In Health. Their work gave me language to describe my passion and beliefs around the power of determination, innovation, empowerment, and accompaniment to prove that providing HIV-treatment was possible, even in remote areas with the most marginalized communities. Dr. Farmer’s book *Pathologies of Power* [60], further elaborates on health as a human right, dissecting “structural violence” underpinning health injustice, while applying both moral imagination “pragmatic solidarity” to treat HIV and drug-resistant tuberculosis with governments, communities, researchers, and collaborators in Haiti, Peru, and Russia. I was hooked; my copy of this book is one giant underline and the margins are full of exclamation points. They had demonstrated that delivering more equitable, effective and cutting-edge medicine was possible. These experiences motivated me towards medicine and public health, recognizing the interplay between directly delivering care while improving health systems.

Fast-forward to 2013—through a degree in infectious disease epidemiology and a two-year stint working on national public health programs in the US—I landed in Lilongwe, Malawi, to meet new colleagues and spend four hours driving through the hills of Malawi and up the (infamous) dirt road to join the Partners In Health team in Neno [130, 146]. I had no global health experience, but with a big and naive heart, I joined the Monitoring and Evaluation team as a volunteer operational research coordinator. I was wholly unprepared for this experience and thanks to many (very patient) mentors, friends, colleagues, and so many humbling experiences, I slowly grew more comfortable. I also messed up a lot, overstepping my knowledge, not listening to my colleagues, proposing wholly inappropriate ideas, and feeling that my “expertise” could be used to radically improve systems. Over many dinner tables and porch sits, my colleagues, and friends would talk about our failures, learnings, history, and culture. We would also face the next batch of expats, who would typically land big-headed, ready to push their expertise and solutions. Over time, I saw how many times my Malawian and Liberian colleagues repeated the same program orientation, answered the same questions, and demonstrated exceeding patience while hearing yet another person’s long-winded recommendations on how to “fix” their programs and systems. I was guilty of being this expat too (over and over again) and, despite my experience, I

still failed miserably to stay quiet, accompany and support rather than lead. I tried my best to lead the Monitoring, Evaluation, Informatics, and Research teams in culturally sensitive ways, inviting feedback (anonymously in Malawi and around-the-table in Liberia) on how to improve and support professional growth of each team member. Yet, it was clear that I was an outsider doing my best to respect the communities I lived in.

Now, fast-forward to 2019, when I left Harper, Liberia, to start this PhD program in Human Centered Design and Engineering (HCDE). I was obsessed with rethinking health information systems, with emphasis on designing efficient and easy-to-use electronic medical records systems that meet health providers' needs. I jumped into HCDE wide-eyed, skeptical of human-centered design methods, and absolutely naive about the underbelly of deep research and tradition in this field. As I sat in my first HCDE classes, I was googling all the new terms—"twitch," "CHI," "human-computer interaction," "epistemology," "boundary objects"—under the table as I adapted to a new field. Much like my adjustment to Neno and Harper, readjusting to the glossiness of life in the United States and wrestling with the discomfort of moving from a professional role where I led teams and programs to being a graduate student in a field I knew very little about.

I continued to work remotely in global health supporting partners in Liberia and eventually joined the Digital Initiatives Group at I-TECH, where I still work today. My five years in Seattle exposed me to the realities of working in the field of global health from "across the pond," further amplified by the COVID-19 pandemic and reliance on completely remote work.

Reflexivity Statement: My privilege is extensive. It has allowed me to access incredible education (steeped in Western traditions), exposure to many cultures and countries, afforded me extensive learning from internships, fellowships and jobs, and allowed me to save money and receive monetary support from my parents. I have been encouraged to meander and learn with a huge safety net below me. I am also white in a country with a long history of segregation, where my whiteness amplifies my privilege. Today it is socially and legally acceptable to love my friends and partners of different races. I am a woman living in the 21st century, permitted to vote, attend university and pursue a career. I also have the resources to do so.

This history of privilege influences my beliefs and values. I am an optimist who believes humans are inherently good. I believe that inequities have persisted across our long histories and these directly influence our health and that it is possible to interrupt inequitable cycles. I believe that humanity unlocks our full potential through equity. I see that innovation occurs in all corners of the world, where humans will forever work to improve their lives and communities. It is just that the privileged have bigger microphones and platforms to share their innovations, spout their successes, and have the resources to extend their reach. I have this platform too, as highlighted by this dissertation.

Positionality statement: My identity, experiences, training, and connections with friends and colleagues around the world are directly woven into my desire to expose global health to critical reflection. I occupy a unique position as an insider-outsider, still new to the field of Human-Computer Interaction (HCI) and with many years working in global health. This insider global health perspective provides first-hand exposure to the strengths, limitations, idealism, and complex impact of global health interventions. I recognize that my academic training and relative seniority in global health is an advantage, specifically helping me to build and now tap a network of colleagues to recruit participants for this study. However, this also carries biases. While participants did not directly work with me on projects, they may know of me and feel compelled to be overly positive about this work

through their social desirability bias. Additionally, my experiences within the field might create a lack of perception in my research design. I also continue to feel like an outsider to the Human-Computer Interaction field, despite five years of incredible academic training. Through this, I bring fresh yet still naive perspectives on the importance, methods, and problematic elements of human-centered design (HCD). Global health has an appetite for HCD methods. I have also honed new lenses for critiquing health datafication, AI-uses in healthcare, and the discomfort and power of critical reflection.

My personal lack of regular, critical reflection on my global health work motivated my research. I see the power of reflection as applied in the field of Human-Computer Interaction to support discourse and critique. This research echoes my deep-rooted belief in health as a human right and that there is a need to examine how we each perpetuate systemic violence. I believe that global health practitioners have exquisite intentions, yet we inflict unintentional harms. But that's just it. We have the resources and capacity to move beyond shrugging off our "unintentional consequences" [131]. We can identify our limitations, wrestle with this discomfort, seek opportunities for growth, and build a stronger movement that delivers more culturally brilliant, equitable and impactful health interventions. I believe it is possible to reimagine global health and that reimagination will catalyze better health outcomes.

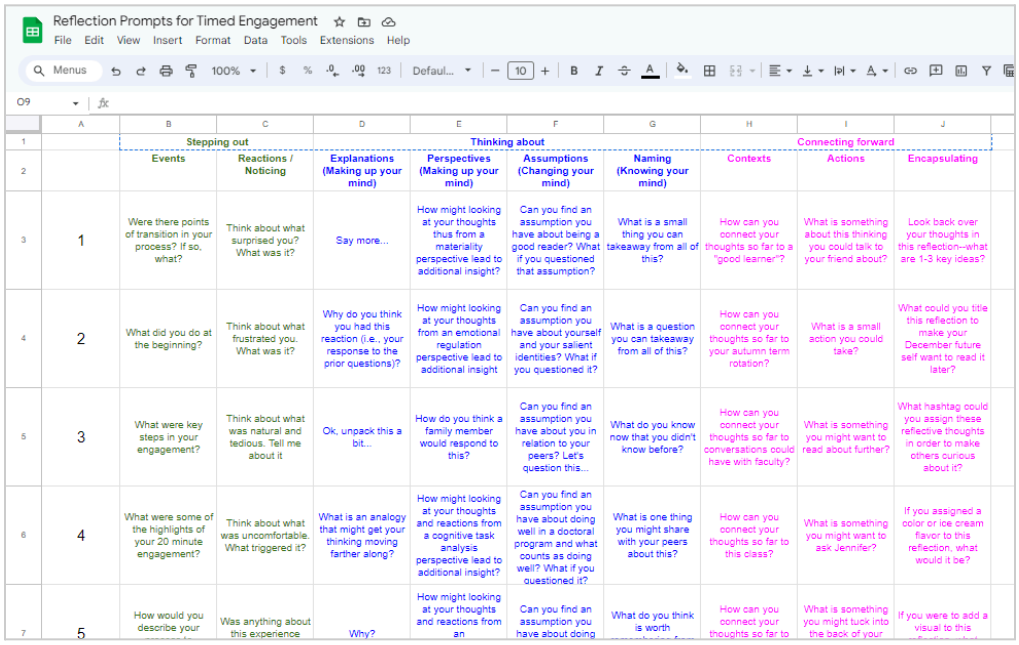
1.2-2 Reflecting on reflecting: lessons from personal practice

My coursework for the University of Washington Human-Centered Design and Engineering PhD program led me to a mechanism for reimagination: critical reflection. While there was critique of the field of global health, I often saw how we practitioners pointed to structures rather than our individual practices. My ideas were certainly informed by local culture and practices, yet there was an inherent emphasis on my skill set and US-training to lead and guide the approach. We worked to adapt and contextualize interventions, improve them for our context, but rarely questioned the roots of why and how they were originally designed. In my work leading Liberia and Malawian monitoring and evaluation teams (aka. we designed and implemented health care data systems), we were typically told what to collect rather than working with our team to leverage and strengthen our existing, Ministry of Health-led data infrastructure. Rarely could we see where this data went or feel how it improved our work. Yet, while we felt the injustices of pure data extraction, I was not regularly critical of my role in this system, nor thinking about the ways I could disrupt my promotion of the status quo. I did not use my power enough; I stayed silent when top donors visited us in the hallways of the newly painted hospitals (literally primed for their visit).

I did not practice epistemic disobedience; in fact, I had not heard the word "epistemology" since college, until Dr. Jennifer Turns' *Empirical Traditions* course in the Fall of 2019. This course focused on understanding various ways of knowing and the importance of critical reflection of our practices. Building upon her research on critical reflection in engineering education [8, 166, 167], Dr. Turns introduced us to different reflection techniques to help us shake up our deeply held ideas. We mapped our thinking in various ways: color coded our readings to see how arguments were developed; created diagrams of our positivist and constructionist viewpoints, and submitted weekly journal exercises about what we were learning. Turns' goal was not only to help us see different articles' structures and arguments, but also to critique our assumptions and vantage points. She often shared that we could read these with "generous critique" that acknowledged the authors' scholarship and approach, even if we disagreed with the methods or findings.

One dice-based reflection method particularly struck me. Dr. Turns gave each student a set of three differently colored dice and a grid of categories and reflection questions (Figure 1.2-2.1). Each die's color corresponded with a category of the reflection question. During a timed activity, we rolled the dice to randomly select a question from each category. This playful practice ensured we answered various questions with short bursts of reflection.

Figure 1.2-2.1. Screenshot of Jennifer Turns' reflection exercise from her Fall 2019 Empirical Traditions course. The image shows the three categories of questions (in the columns of green, blue, and pink text) and the six rows of questions with each row corresponding to a number on the six-sided die.



Reflection Prompts for Timed Engagement

		Stepping out		Thinking about				Connecting forward		
		Events	Reactions / Noticing	Explanations (Making up your mind)	Perspectives (Making up your mind)	Assumptions (Changing your mind)	Naming (Knowing your mind)	Contexts	Actions	Encapsulating
1	1	Were there points of transition in your process? If so, what?	Think about what surprised you? What was it?	Say more...	How might looking at your thoughts thus from a materiality perspective lead to additional insight?	Can you find an assumption you have about being a good reader? What if you questioned that assumption?	What is a small thing you can takeaway from all of this?	How can you connect your thoughts so far to a "good learner"?	What is something about this thinking you could talk to your friend about?	Look back over your thoughts in this reflection--what are 1-3 key ideas?
2	2	What did you do at the beginning?	Think about what frustrated you. What was it?	Why do you think you had this reaction (i.e., your response to the prior questions)?	How might looking at your thoughts from an emotional regulation perspective lead to additional insight	Can you find an assumption you have about yourself and your salient identities? What if you questioned it?	What is a question you can takeaway from all of this?	How can you connect your thoughts so far to your autumn term rotation?	What is a small action you could take?	What could you title this reflection to make your December future self want to read it later?
3	3	What were key steps in your engagement?	Think about what was natural and tedious. Tell me about it	Ok, unpack this a bit...	How do you think a family member would respond to this?	Can you find an assumption you have about you in relation to your peers? Let's question this...	What do you know now that you didn't know before?	How can you connect your thoughts so far to conversations could have with faculty?	What is something you might want to read about further?	What hashtag could you assign these reflective thoughts in order to make others curious about it?
4	4	What were some of the highlights of your 20 minute engagement?	Think about what was uncomfortable. What triggered it?	What is an analogy that might get your thinking moving farther along?	How might looking at your thoughts and reactions from a cognitive task analysis perspective lead to additional insight?	Can you find an assumption you have about doing well in a doctoral program and what counts as doing well? What if you questioned it?	What is one thing you might share with your peers about this?	How can you connect your thoughts so far to this class?	What is something you might want to ask Jennifer?	If you assigned a color or ice cream flavor to this reflection, what would it be?
5	5	How would you describe your	Was anything about this experience	Why?	How might looking at your thoughts and reactions from an	Can you find an assumption you have about doing	What do you think is worth	How can you connect your thoughts so far to	What is something you might tuck into the back of your	If you were to add a visual to this

The course forced me to grapple with my resistance to reflective practices. Writing reflections felt both trivial and superficial, particularly given this was a course requirement. However, Dr. Turns encouraged me to explore this resistance, leading me to reflect on my resistance to the act of reflection itself and stretching to take a more open-minded approach to graduate studies in a new field. Gradually, I began to shift my perspective.

1.2-3 Creating and organizing the original prompt library

Recognizing both my initial resistance to reflection and value, I began seeking ways to critically examine my perspectives. Inspired by Dr. Turns' course, I began exploring how my personal commitments and viewpoints shaped my approach to global health work. In particular, I was inspired by an interview with Sarah Hamid [70] on her approach to carceral technology abolition. As Hamid described,

> Beyond trying to build a different relationship to knowledge, another thing that we do that is fundamentally different from academic communities is that we always start with first commitments. That's always the longest conversation of any new organizing formation. ***What are you committed to? What are you refusing to compromise on? What are you building towards?*** [70]

This sparked me to want to formalize my own commitments, values, perspectives, and approaches. During the Spring term of my second year in the PhD program, I began recording insights and questions from my coursework readings that could help me explore. This initial list of questions (Table 1.2-3) came from readings assigned during Dr. Beth Kolko's Feminist Theory course and Dr. Sucheta Goshal's Critical Technology Practice courses.

Table 1.2-3 Initial list of reflection classes I recorded during my Spring 2021 courses

Reflection questions from readings in the Feminist Theory course taught by Dr. Beth Kolko ● What are the gray areas in this technology space? How am I falsely dichotomizing the "problem" space? [71] ● How might I diversify my ways of knowing for this project or program? [39] ● What are the individual, community, and structural layers of power? [39] ● What am I uncertain about? Can you even name the uncertainty? If not, good… just embrace that it is there and exists. [131]
Reflection questions from readings in a Critical Technology Practice course taught by Dr. Sucheta Goshal ● How might new ways of knowing illuminate the problem space differently? [107] ● How might art or movement illuminate this area? [107] ● What are the political arrangements underlying my work? How might funding, academic, industry, police, government interact? [70] ● What structural issues could this technology perpetuate? [17] ● What is progress for? [50] ● What is technology for? Who really is it for and why?[50] ● How might I be pretending that "technological innovation" always connotes linear progress? [50] ● How might this project or program reinforce power structures? How might it liberate or give people the ability to "live and to thrive"? [70] ● What values may be encoded in this technology? [24]

Through more coursework and assignments, and particularly as I read for the General Exam, I recorded more provocative questions from my readings that would guide my personal reflection practice. This list of questions is what I now call the ***reflective prompts library***. When I shared the expanded library with my committee as part of my General Exam, my global health committee members Dr. Nancy Puttkammer and Dr. Sarah Irribarren expressed enthusiasm for and potential utility of this work to reshape the field. Inspired by their feedback, I began to consider this as a dissertation research idea. This dissertation describes how I turned the reflective prompts library into an intervention for global health practitioners. I integrated both Feminist Theories and HCI research into the design and conducted workshops with global health practitioners to better understand the extent to which this tool supported reflection practices and to learn how reflection may provoke action.

1.3 Research questions and dissertation overview

Overall, this dissertation hypothesizes that adopting critical reflexive practices can guide global health practitioners to reflect on power asymmetries, better understand their role upholding the status quo, and

ultimately provoke a rethinking and reimagination of global health programming. I am motivated to study this topic given the deep-rooted inequities in the field of global health, where a select few still have overwhelming power to determine health priorities and programming. Indeed, global health practitioners are, to varying degrees, contributing to perpetuating inequities. I argue that reflection offers a pathway for individual global health practitioners to interrogate dominant paradigms and uncover fresh approaches to their work, and this is a catalyst for change. This dissertation explores this topic by answering three research questions designed around building and testing an interactive artifact called *(re)imaginator* designed to support critical reflection practices for global health practitioners. You are welcome to test the intervention yourself here: https://reimaginator.org/.

RQ1. How can design for reflection scholarship support reflexivity for global health practitioners?

Sub-question

- What is the evidence around how to design for reflection?

Summary of findings

- Design for reflection scholarship was incredibly useful when designing this intervention. There is a wealth of knowledge around what kinds of interventions, digital or otherwise, promote reflection and the specific design features that amplify self reflection.
- In particular, this intervention leveraged ludic design elements recommended by Sengers et al. [154]. While participants reported a high rate of "enjoyment using the tool," they also found the random order of reflection questions, inspired by the Magic 8 Ball toy, to be chaotic rather than playful and recommended a more structured reflection intervention (e.g., specific question order, ability to curate a list of questions, displaying a total count of questions available).
- Fleck and Fitzpatrick's *Levels of Reflection* [61] model and Mezirow's transformative learning steps [88, 111] were useful expansions of Senger et al.'s definition of 'critical reflection' [154] for how reflection can lead to action.
- Ortiz-Lampier's systematic literature review provided an in-depth synthesis and critique of HCI's use and limitation of both qualitative and quantitative tools to measure reflection depth and themes [124].
- Ortiz-Lampier also recommended and adapted the *Learning Activities Survey* for his HCI research to measure Mezirow's stages of reflection for a digital reflection intervention [125]. This served as one backbone for evaluating the extent to which this intervention provoked critical reflection and resulted in action (see RQ3 section below for results).
- Bentvelzen et al.'s literature review describes a catalog of HCI interventions designed to provoke reflection and evaluate their designs [18]. Their synthesis exposed gaps in evaluation methods and led them to create the *Technology-Supported Reflection Inventory* to better compare interactive reflection interventions [19]. This helped us gather feedback from participants on the intervention designs.

Dissertation contributions: This dissertation contributes detailed instructions on how we adapted both the *Learning Activities Survey* (LAS) [88] and *Technology-Supported Reflection Inventory* [19] to measure perspective changes and effectiveness of our reflection intervention *(re)imaginator*. To my knowledge this is the first time a detailed adaptation of these tools has been thoroughly documented, particularly in HCI. This can be used to guide future use and extension of these tools. I advocate in Chapter 5 that the LAS may benefit from a Likert scale

to measure smaller changes in transformative learning over time. However, further research is needed to validate the reliability and effectiveness of this scale compared with the existing approach.

I also advocate that adapted LAS and TSRI surveys, like those used in this dissertation, may be useful tools for global health practitioners interested in measuring the impact of any reflection intervention. As global health practice continues to encourage reflection and epistemic justice [4, 5, 21, 121], measuring the connection between changes in thinking and resulting action may generate a body of evidence on what works in decolonizing the field. This kind of methodological extension requires additional validation research, though this evaluation appears worthwhile given our participants' desire for more examples of what has worked for others to change practice. Our field's prioritization of evidence-based interventions could be served by this kind of research; however, a library of anecdotal and contextualized examples would also be useful, according to our participants.

This dissertation also describes (Chapter 4) how we applied evidence from the *design for reflection* literature to build and test an interactive reflection tool for global health. To our knowledge, this is the first intervention of its kind that aims to provoke critical reflection and transformational learning in global health.

RQ2. How do global health practitioners engage with and perceive *(re)imaginator* for critical reflection?

(re)imaginator is the intervention tool that we designed for global health practitioners using evidence from HCI.

Sub-question

- RQ 2.1. How do global health practitioners describe their baseline personal and organizational reflection practices?
- RQ 2.2. How do participants describe using *(re)imaginator* for reflection?
- RQ 2.3. How do participants engage with *(re)imaginator* for reflection?

Summary of findings

- Study participants reported seeing value in and an appetite for reflecting on their work, but they described their baseline personal reflection practices as ad hoc and informal. This highlights opportunities for more structured reflection tools like *(re)imaginator*.
- Participants indeed recommended more structured tools, as the *(re)imaginator's* random order of questions was deemed chaotic. Participants expected a more structured approach for reflection, with features like creating their own panel of reflection questions or ordering questions into sets that more clearly build on one another.
- 75% of participants agreed that they enjoyed using the *(re)imaginator* tool and 50% somewhat agreed that the tool supported thinking about their work in new ways, highlighting how this specific tool may be appealing to a broad group of stakeholders and promote some changes in thinking
- Notably, participants from the implementing and implementing/research organizations, who predominantly originated from low- and middle-income countries, reported the highest enjoyment and changes in thinking from this intervention.
- Participants also noted a desire for reflection tools to include more guidance that linked them to recommendations and resources to guide their individual actions.

- Participants saw the importance of connecting their personal reflections with their colleagues and peers as a critical driver for changing systems. They recommended adding resources, like a companion to support facilitated meetings, that could support dialogues with their colleagues.
- Relatedly, 96% of respondents of the follow-up survey expressed support for integrating reflection into their organization, noting that this is a "low resource" initiative that could impact practice. Yet, only the academic participants described monthly forums to promote reflection. Other participants noted annual and project review meetings as the core way they reflect on their work. Participants did not share any tools that specifically provoked individual or group reflection as part of these processes.
- However, participants also emphasized the need for more psychological safety within their organizations to promote candid reflection, given the personal and professional risks of critical reflection. Indeed, even with the *(re)imaginator* tool, participants posted 81% of their reflections privately. They recommended that leadership could stoke such an environment by being open to change and vulnerable in sharing their reflections.
- One participant highlighted that the speculative design group activity was useful for creating feelings of safety. He thought that the act of describing a distant future where his organization had integrated reflection, and it was "going well" was a useful activity to do with his colleagues. This exercise not only shifted focus away from individual-level changes and responsibility, but also helped generate mechanisms within the organization to support change.
- Participants recommended funding organizations as the primary group where reflection and resulting changes would have the most substantial impact on changing the field of global health. This aligns with evidence of known power asymmetries outlined in Chapter 1.1, where funding organizations "significantly influence global health priority-setting" [20].
- However, participants from the funding organizations consistently gave *(re)imaginator* the lowest ratings. They noted that integrating reflection tools, or changing any process within their organization, was "Herculean." This highlights opportunities for more research on how to design for reflection with funding organizations to better tailor reflection touchpoints into their practices.

Dissertation contributions

This dissertation found current reflection practices within global health as ad hoc and informal, though study participants report seeing value in reflecting on their work. This indicates opportunities for more structured reflection tools like the *(re)imaginator* to guide individuals in this practice. In fact, to our knowledge, this dissertation presents the first-ever interactive digital intervention designed to support global health practitioners to reflect on their work. It also offers evidence that global health practitioners recommend integrating reflection into organizational practice. They see value in connecting individual practice with group activities, yet this dissertation also highlights the importance of creating more psychological safety within organizations if they want to promote change. Speculative design activities may offer a mechanism for connecting individual reflection to collective action.

This intervention also offers evidence on how to customize reflection for different stakeholder groups within global health (e.g., implementers, researchers, and designers); however, more research is required for tailoring reflection tools for funders as *(re)imaginator* did not appear to meet their needs. Notably, participants from implementing and implementing/research organizations, predominantly from low- and middle-income countries, reported the highest levels of enjoyment and changes in thinking. This suggests that the tool may be

particularly effective in empowering new thinking from non-Western practitioners and offers a possible mechanism to stoke "epistemic disobedience" [120, 121]. As the field begins to prioritize and legitimize new epistemologies, this dissertation offers compelling evidence for how critical reflection can empower new ways of thinking and action.

RQ3. To what extent does engaging with *(re)imaginator* provoke individual global health practitioners to rethink and reimagine their interventions?

Sub-question

- RQ3.1 What level of perspective transformation do global health practitioners experience directly after using *(re)imaginator*?
- RQ 3.2 How does perspective transformation change over time?
- RQ 3.3 What design features may help global health practitioners critically reflect and embed reflection into practice?

Summary of findings

- Nearly half of participants reported that the tool helped them question the way they act and over 60% committed to adopt new ways of acting. However, these trends were not sustained for the 23 respondents of the follow-up survey.
- This finding may make sense as participants made several design recommendations for how to better connect the individual reflections to action. They suggested that after writing their reflection, the tool tailored resources that could guide future action (e.g., case studies, toolkits, and studies). While the *(re)imaginator* presented a library of resources on the *learn* page, these were not tied to specific questions and this could be a further innovation to support reflection to action. They also proposed writing action plans as a complement to their specific reflections.
- This study demonstrates that group discussions likely contributed to an increase in participants realizing that their colleagues also question their beliefs, hinting at the importance of group discussions to build organizational change. While this finding is intuitive, the low baseline, as measured with the *Learning Activities Survey*, suggests that practitioners may feel isolated in their beliefs and lack visibility into their colleagues' similar uncertainty around their beliefs. Participants expected and proposed that *(re)imaginator* be connected to more facilitated group activities to enhance transforming reflection into actions and to stoke organizational change.

Dissertation contributions

This study offers evidence on how to use the *Learning Activities Survey* and *Technology-Supported Reflection Index* to measure effects of reflection interventions. It also outlines how these tools could be used with repeated measures to compare whether reflection leads to action over time. This approach may help organizations better measure "decolonization" initiatives, particularly if they are committed to incorporating and empowering epistemological diversity.

This study shows that while *(re)imaginator* supported participants in immediately thinking differently about their work, it did not lead to them taking action during the follow-up window. More research is needed to help practitioners connect their individual reflections to actionable resources, and this study offers several design

recommendations for how to better create this linkage. It also offers evidence on how connecting individual reflection to group conversation may help practitioners connect with change-makers within their organization.

Chapter Overview

This dissertation is organized into six chapters as follows:

	Chapter Map
Introduction	**Chapter 1** is the introduction chapter you are currently reading. It sets the stage for this dissertation topic, including a brief overview of global health and the research questions.
	Chapter 2 describes the theoretical basis of this dissertation research.
RQ1. How can design for reflection scholarship support reflexivity for global health practitioners?	**Chapter 3** summarizes findings from the scoping literature review of "design for reflection" research in the Association of Computing Machinery Digital Library. **Chapter 4** describes *how* the scoping literature review evidence was applied to design Prototype v1 of the research intervention *(re)imaginator.* It also outlines *(re)imaginator* Prototype v2 testing and pilot workshop.
RQ2. How do global health practitioners engage with and perceive *(re)imaginator* for critical reflection?	**Chapter 5** describes the main research study of testing *(re)imaginator* Prototype v3 with global health practitioners. It highlights perceptions of and engagement with the intervention to provoke reflection.
RQ3. To what extent does engaging with *(re)imaginator* provoke individual GH practitioners to rethink and reimagine their interventions?	Chapter 5 also delves into the degree to which engagement with *(re)imaginator* stimulates individual global health practitioners to reconsider and reshape their interventions.
Conclusion	**Chapter 6** is the concluding section of the dissertation that summarizes the research and identifies future work.

2 | Theoretical grounding: critical reflection & Feminist Theory

> *A **critical technical practice will… require a praxis of daily work**: forms of language, career strategies, and social networks that support the exploration of alternative work practices that will inevitably seem strange to insiders and outsiders alike. **This strangeness will not always be comfortable, but it will be productive nonetheless**, both in the esoteric terms of the technical field itself and in the exoteric terms by which we ultimately evaluate a technical field's contribution to society*. — Philip Agre [10], emphasis added

The field of Human-Computer Interaction (HCI)—which explores the relationship between people and computer technologies—recognizes that technological interventions have unintended consequences [10, 12, 41, 53, 131, 154]. This acknowledgment is a relatively recent development and is a departure from early HCI literature that focused on examining challenges related to technology engineering and use. Today, however, many HCI practitioners acknowledge and articulate how technologies may embed implicit biases and are actively working to create more transparent, inclusive, equitable, and effective interventions [41, 59]. HCI has drawn from multiple traditions to examine the values and assumptions woven into technology design and implementation [10, 154, 171]. The field also has researched how to integrate critical reflection into practice, from engineering education [166] to technology design [154] and development [10, 155].

As a component of this overall shift in the field, critical technology studies uses the phrase "critical reflection" to describe the critique of both how technologies are designed and built and their differentiated effects on individuals, communities, and societies [10, 53, 154]. HCI-scholar Phoebe Sengers and colleagues define **critical reflection** as,

> …bringing unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice. This critical reflection is crucial to both individual freedom and our quality of life in society as a whole, since without it, we unthinkingly adopt attitudes, practices, values, and identities we cannot consciously espouse. …Unconsciously held assumptions are not things we rationally know; they are part of our very identity and the ways we experience the world. Similarly, critical reflection does not just provide new facts; it opens opportunities to experience the world and oneself in a fundamentally different way.[154]

Critical reflection, then, is a process to interrogate one's assumptions. Reflection aims to help alter perceptions, intentions, and interpretations to better see the world and ideally to prompt a reimagination of actions and interventions. The idea is to create a critical practice that—as sociotechnical researcher Philip Agre describes in a formative article—"will, at least for the foreseeable future, require a split identity -- one foot planted in the craft work of design and the other foot planted in the reflective work of critique" [10]. This line of research goes on to argue that prudent practitioners should simultaneously create interventions while critiquing their creations.

Critical reflective practices acknowledge the importance of split identity and offer important ways to interrogate the present, explore alternatives, expand knowledge, and reimagine interventions [1]. Reflection also allows practitioners to step out of their assigned roles and consider alternative strategies for the same interventions. This literature is especially resonant for the larger project of interrogating global health. It offers opportunities for articulating the possibilities for practitioners to engage in reflection and, potentially, explore alternatives to their creations. While global health interventions have potential unintended consequences, the field does not

have a culture of critiquing and revealing its failures [127]. The funding landscape—where governments, implementing organizations, and academics apply and compete for resources—makes transparency and accountability unlikely. Sharing failures with funders or in manuscripts can ruin careers and organizations. HCI's rationale for building critical reflection practices offers global health a roadmap for the why and how of critique and may minimize the risk of negative repercussions. However, critique alone is insufficient. To move beyond simply identifying problems with interventions, we must also consider how to design those interventions more effectively.

2.1 Artifacts have politics

Langdon Winner's work on the political nature of technological artifacts offered valuable insights for how to think more critically about global health interventions. His paper "Do Artifacts Have Politics?" kick-started my understanding of technological artifacts not being neutral [171]. Winner's exploration of the political nature of technological artifacts provided a valuable lens for examining global health interventions. His core argument—that interventions are not separate from, but rather embedded within and therefore reflect social and economic systems— resonated with the need for a more critical approach to global health practices. Winner illustrated numerous instances of political designs, such as controlling bus access to beaches by constructing low bridges on Long Island. Technological interventions mirror the power dynamics and social structures inherent in their creation.

Winner's article highlighted the importance of intervention design. Designers bear the responsibility of scrutinizing the context and values that shape their interventions. Further interventions reflect what Winner called the "political properties" of their context and decision-makers [171]. Said another way, interventions are a "way of settling an issue" [171] and reflect the choices of their creators and settings. By acknowledging the influences in intervention design decisions *and* the implications of their use, designers can actively work towards ensuring that interventions better align with desired societal outcomes and values. This underscores the significance of considering the broader socio-political landscape when engaging in technological and design practices.

For the global health community, Winner's work challenges our field to examine contexts and values that shape how they design interventions; thinking about how they might unintentionally reinforce existing inequalities or limit access for certain populations, for example. By understanding the "political properties" of interventions, global health practitioners may design them through a more inclusive and equitable lens. This also means considering the social and economic context where the intervention will be used, and actively working towards solutions that better align with the needs and values of target communities. To illustrate this thinking, let us consider why the George W. Bush administration started the President's Emergency Plan for AIDS Relief (PEPFAR). This critical funding mechanism has invested over $100 billion dollars on HIV care prevention and treatment over 20 years, and supports "more than 20 million men, women, and children with life-saving antiretroviral treatment" [32]. What specific political pressures and motivations have shaped this program's evolution and informed today's programming? Why, for example, does PEPFAR now support huge disease surveillance systems and require complex, patient-level reporting on a quarterly basis (systems that often rely on healthcare workers to review every paper medical record to extract data)? Per the reporting, GW Bush seemingly started PEPFAR because conservative evangelicals lobbied him to make antiretrovirals (long known to turn this deadly disease into a manageable condition) available globally to end meaningless suffering and death [90].

While admirable, over the last 20 years, presidential priorities have changed (e.g. the global gag rule), budget cuts are common (e.g., $400 million cut in FY25 announced last week [84]) and PEPFAR reauthorization requires justification for renewal. This system of monitoring has led to a pipeline of sensitive patient data being sent to the US government to justify these investments. Imagine if we sent our HIV care data to France or Germany? These investments give the US power. They use this leverage to direct where to spend money within countries [173], often sitting at the center of the table at respective Ministries of Health to set the programming for "epidemic control." This gives the US significant control. One example is promoting voluntary, adult male, medical circumcision programs to reduce HIV incidence [140]. Despite its epidemiological effectiveness, from my vantage point, this way to "engage men into the healthcare system" (as I have heard it described, particularly given the difficulties of engaging men for HIV testing) is ethically problematic and disruptive [64, 103, 141]. Can you imagine the US government running public campaigns in the US to promote this practice for American men? There are clearly better ways to engage men in care that aim above the belt. While there is no doubt that PEPFAR has saved lives, supported economic growth, and propelled research, it also gives the US government control. In global health, these "artifacts" of our interventions (e.g., disease surveillance systems, prioritized programming) are set by our politics. Winner's work highlights the importance of tracing these factors and unpacking the "whys" of today's programming. Looking at underlying politics shows us where, to borrow from Winner's example, the low bridges of global health care sit and how this infrastructure can stifle, rather than accelerate, health outcomes.

2.2 Feminist Theory and the partiality of perspective

In fostering a culture of critique, global health practitioners can draw insights from Feminist Theory. Broadly, Feminist Theory provides a thorough examination of how gender roles contribute to disparities within various cultures and societies, especially capitalist ones. Importantly, Feminist Theory goes beyond looking at power dynamics solely through a gendered lens. Lawyer and feminist scholar Kimberlé Crenshaw introduced the concept of intersectionality, illuminating how individuals experience overlapping systems of oppression based on factors such as gender, class, race, and ethnicity [42]. Building on intersectionality, this dissertation delves into the interconnected structures that perpetuate harm and inequality. By employing a feminist lens, we can better understand the limitations of our perspectives and cultivate a critical approach.

Specifically, feminist scholar Donna Haraway's concept of "situated knowledge" offers scaffolding for recognizing and accepting the limitations of an individual's knowledge [71]. As individuals grow and gain experiential knowledge, their perspectives undergo evolution, albeit constrained by the inherent limitations imposed by their finite reach. Haraway emphasizes the impossibility of the "God trick" of omnipresence and underscores the significance of individuals acknowledging the boundaries of their perspectives [71].

Haraway also acknowledges the beauty and complexity that comes with accepting there is a diversity of knowledge. She asserts that we need,

> … an earth-wide network of connections, including the ability to partially translate knowledge among very different and power-differentiated communities. We need the power of modern critical theories of how meaning and bodies get made, not in order to deny meanings and bodies, but in order to build meanings and bodies that have a chance for life. [71]

Haraway undercuts the notion of superior and inferior knowledge, noting that humanity only can partially understand and therefore elevate new ideas. The emphasis on “partiality” is critical to her argument. Haraway recognizes that a person’s own boundaries limit their understanding of the world. People see the world in unique and overlapping ways, yet one must recognize that it is impossible to fully comprehend someone else's perspective. She calls particular attention to the danger of “romanticizing and/or appropriating the vision of others less powerful while claiming to see from their positions” [71], an important concept for global health practitioners to consider when approaching critical reflection. Haraway notes that translation (or an “embodiment” of another’s position) is always interpretative. A person can never fully grasp another's vantage point and must recognize that, even with the best intentions of trying to understand, they will inherently mix into their partial and imperfect perspectives.

Haraway further emphasizes that individual stories and perspectives are both never fully finished and never whole [71]. As a person ages, they gain new experiences, but always from their situated vantage points. In short, humans can simultaneously acknowledge both their limitations and their beautiful, perpetual movement and growth. There is power in self definition, and critical reflection can help people see that their knowledge is heavily situated and therefore limited. Acknowledging and seeing these boundaries offers the possibility for growth.

The concept of “situated knowledge” is particularly salient in global health. This field is often dominated by privileged “experts” with clinical and public health training primarily from Europe and North America, who hold disproportionate power in shaping health system priorities. Consequently, health systems are frequently designed from a narrow, top-down perspective, excluding the diverse knowledge and experiences of the communities they aim to serve. This overreliance on a singular, expert-driven approach limits the effectiveness of interventions and perpetuates existing health inequities.

Additionally, there is limited discussion in global health about the formation, application, and prioritization of knowledge. As Clinical Psychologist Thirusha Nadiu and colleagues describe:

> …because coloniality is intertwined with dominant models of research… [where] researchers are trained to believe and reproduce assumptions… based on Euro-American epistemic dominance. Globally, researchers adopt methods and approaches based on colonial knowledge systems in lieu of situated or contextual knowledge. These assumptions may ignore or deny the humanity of research participants and disregard their ability agency in their lives and contexts. Knowledge production emanating from this approach to research is complicit with the oppressive practices of sorting, labeling, and controlling the lives of everyday people. Oppressive research practices position people inaccurately as these practices use external lenses for research purposes that serve to create evidence for externally developed research questions and hypotheses. [120]

Through a practice of examining situated knowledge, global health practitioners will be provoked to question why their “expertise” is prioritized. Recognizing that expertise is always shaped by perspective, the term “Technical Expert” becomes a misnomer worthy of regular reappraisal.

2.3 Self knowledge is never finished business

Haraway reinforces the need to continually reassess knowledge structures by highlighting that our personal experiences and viewpoints are both incomplete and limited [71]. As she describes, our knowledge is "stitched together imperfectly" [71]. As we age, we gain new experiences, yet our perspectives remain anchored in specific contexts. This dynamic interplay between growth and constraint underscores the importance of acknowledging our personal limitations while embracing the ongoing process of learning and evolution.

Building upon Haraway's concept of the ongoing evolution of knowledge, Black Feminist scholar Patricia Hill Collins emphasizes the importance of personal accountability [39]. She argues that while self-definition is empowering, it is a continuous process rather than a fixed state. Collins highlights the crucial role of personal responsibility in fostering growth [39]. Recognizing the limitations of our perspectives, that are rooted in specific social and cultural contexts, is essential for both individual and collective advancements in global health. By acknowledging our biases and limitations, we create space for incorporating diverse viewpoints and developing more equitable solutions.

2.4 Incorporating the *Matrix of Domination*

Collins also offers a powerful framework called the *Matrix of Domination* that can be leveraged by the field of global health to better dissect power asymmetries [39]. This framework reveals how oppressive systems intertwine to shape social hierarchies and unequal power dynamics [39]. There are "multiple levels of domination" (which she calls the *Matrix of Domination*) that are structured both along intersecting axes of socioeconomic status, race, and gender, and across personal, community, and institutional levels [39]. This framework describes the complex and interwoven nature of oppression. As Collins describes,

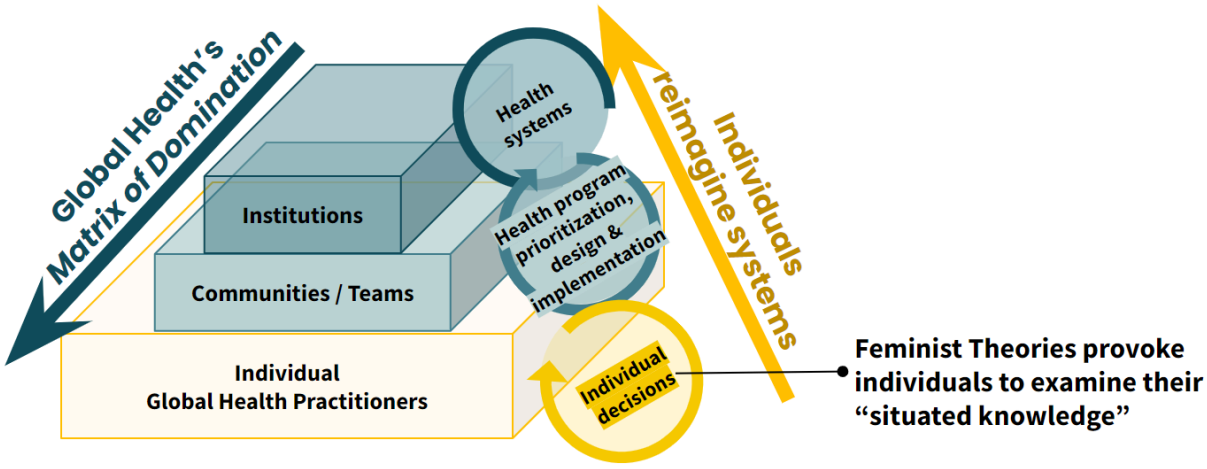
> Afrocentric feminist thought speaks to the importance that knowledge plays in empowering oppressed people. One distinguishing feature of Black feminist thought is its insistence that both the changed consciousness of individuals and the social transformation of political and economic institutions make up essential ingredients for social change. New knowledge is important for both dimensions to change. [39]

Building on this foundation, Collins outlines a path toward dismantling oppression. Collins argues that by critically examining our "situated knowledge" within the context of intersecting identities and hierarchical systems, we can identify opportunities to challenge and dismantle oppression. Collins draws on Crenshaw's concept of intersectionality by highlighting how a person can be privileged in certain groups of people and marginalized in others. As she describes, "depending on the context, an individual may be an oppressor, a member of an oppressed group, or simultaneously oppressor and oppressed" [39]. To achieve meaningful change, we must simultaneously engage and transform individual, community, and institutional structures [39]. She emphasizes the role of individuals within current structures highlighting how, even in difficult situations,

> … there's always a choice, and power to act, no matter how bleak the situation may appear to be. Viewing the world as one in the making raises the issue of individual responsibility for bringing about change. It also shows that while individual empowerment is key, only collective action can effectively generate lasting social transformation of political and economic institutions. [39]

Collins' *Matrix of Domination* offers a new lens for understanding and transforming global health by highlighting how individuals instigate change. It underscores the importance of examining situated knowledge across individual, community, and institutional levels. These levels reflect the multifaceted nature of global health, where individuals with intersecting identities (e.g., race, class, gender, nationality) work in various communities and institutions (e.g., governments, NGOs, and public health agencies) to deliver and improve care. Figure 2.4-1 helps visualize how the *Matrix of Domination* could play out in global health where institutions set and fund their priorities (Chapter 1.1). However, institutions, communities, and organizations are made up of individual practitioners. Feminist Theory, in turn, can inspire these individuals to examine their situated knowledge, privilege and how this impacts their decisions. It also connects how individual, reflective work can provoke reimagining health systems because questioning existing knowledge opens the field for new knowledge production.

Figure 2.4-1. Highlights how the Matrix of Domination could be applied in global health and the power of examining situated knowledge to dismantle oppression.



The *Matrix of Domination* helps dissect power dynamics inherent in global health by calling on individuals within the matrix to bring about change. This theory highlights how generating new knowledge is a key ingredient for programmatic, organizational and institutional change. Collins emphasizes the interplay between stakeholders and creation of new knowledge as mechanisms to dismantle oppressive systems.

2.5 Connecting these theories to global health: a chapter summary

The theories in this chapter all ground this dissertation topic in unique ways. This work aims to apply HCI practices of critical reflection, as defined by Sengers et al. [85], to the field of global health. These practices offer global health practitioners powerful tools to interrogate their interventions, explore alternative approaches, expand their knowledge, and ultimately, reimagine interventions. The field of global health is beginning to articulate the importance of reflexivity [15, 18, 61, 114, 120, 121] and appreciate the influence of situated knowledge [4, 21, 121].

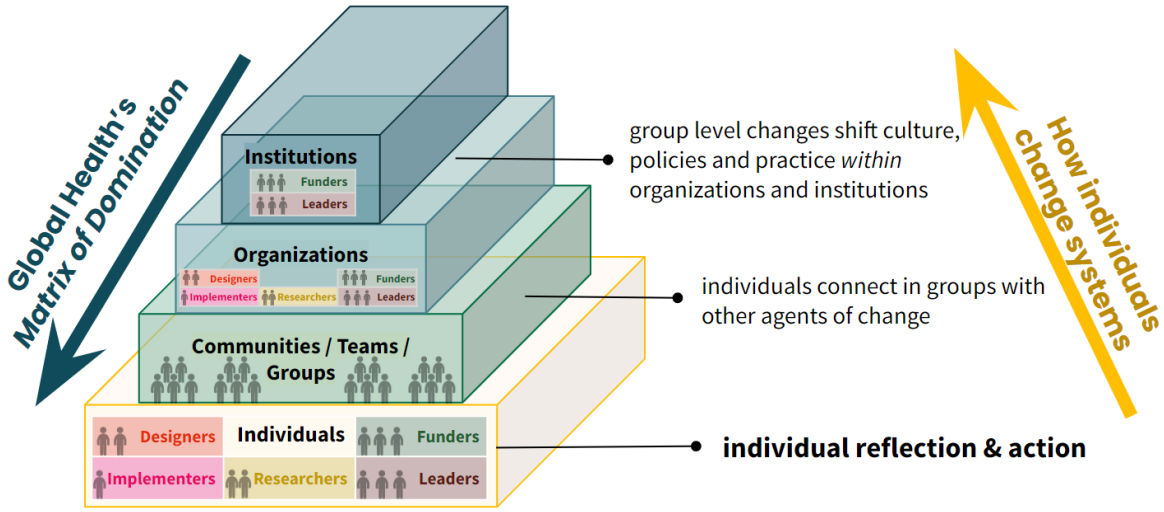
Langdon Winner's work underscores the inherently political nature of technological interventions, revealing how they embed societal values and power structures [171]. This challenges the notion of intervention neutrality that

is often assumed in global health. While the field is increasingly emphasizing contextual implementation of evidence-based programs (e.g., through disciplines like translational and implementation science [65, 105, 110, 170]), a culture of critical reflection on how these evidence-based interventions were created remains underdeveloped. Additionally, global health currently lacks a strong culture of critiquing interventions and openly discussing failures [127]. This can be attributed, at least in part, to the competitive nature of funding, where governments, NGOs, and academics all vie for limited resources and negative press can damage organizations and careers.

Donna Haraway's concept of “situated knowledge” emphasizes the importance of individuals recognizing and critically examining the limitations of their perspectives [71]. Critical self reflection opens opportunities for new ways of thinking and acting. Rethinking can offer practitioners opportunities to the status quo, where self-awareness to one’s own contributions to dismantling oppressive systems is a critical step. Collins’ *Matrix of Domination* extends this idea and offers a framework for understanding how individuals uphold the complex landscape of global health (Figure 2.5-1). I applied her framework to global health to help articulate how individuals in global health are positioned and leverage her idea that individuals must take on the responsibility of seeing their contributions to these intersecting systems of power and privilege. This hierarchical structure perpetuates inequities and limits the potential for transformative change, but where individual-critical reflection is a potential intervention to catalyze change (Figure 2.5-1).

Additionally, global health relies on professional roles that can further define an individual’s position within the system and support tailoring reflection interventions. Specific roles like funders, policymakers, researchers, clinicians, patients, and implementers each play a part in upholding the current global health systems. By encouraging individuals to question their situated knowledge within each of their roles, this dissertation seeks to disrupt current power structures and intervention design. This dissertation expands the Matrix of Domination for global health by separating individuals into their specific global health roles (Figure 2.5-1). Indeed, recent scholarship in global health is also beginning to articulate how Feminist Theory to “meaningfully reduce health equities” [56] and, specifically, call out Patricia Hill Collins’ work to support understanding power structures [4, 30, 56].

Figure 2.5-1. Highlights how specific roles within global health make up the foundation of global health's Matrix of Domination.



Individual reflection may allow for global health practitioners to step outside their assigned roles and consider new knowledge or strategies for their same interventions. The field of Human-Computer Interaction (HCI) emphasizes the importance of critical reflection as a core component of effective design and implementation. By adopting a similar approach, global health may establish a roadmap for integrating critique into its work and design more equitable and effective health systems.

3 | Design for reflection: scoping literature review

HCI's body of "design for reflection" research explores how interventions can promote reflective practices. From how to optimize visualizations of personal informatics to embedding reflection into design practice, the field has built a body of evidence for how to best design interactive systems to support critical reflection [18]. I conducted a scoping literature review [118, 132] to answer RQ1: ***How can design for reflection scholarship support reflexivity for global health practitioners?*** My goal was to distill key ideas from the design for reflection scholarship that I could apply to design and measure a reflection intervention for global health.

3.1 Methods

The scoping literature review aimed to identify and map available evidence around how to design for reflection [118]. Given that the literature on designing for reflection spans various technologies, fields, and measures of effectiveness, a scoping review provides a more flexible approach to summarizing widely dispersed and emerging literature [132]. This methodology is particularly useful because it allows for the inclusion of a broad range of studies, including those with diverse research designs and methodologies.

For this review, given my plans to design an intervention, I focused on the field of Human-Computer Interaction (HCI) and its research related to interactive systems and interventions that promote reflection. Using the Association for Computing Machinery (ACM) Digital Library—the primary database for computing and information technology research—I searched for articles about "design for reflection." I conducted this initial search in early 2023, reviewing all 43 articles written since 2005. I reviewed both abstracts and citations of each article. I then cross-referenced this list with the "reflective design" literature available in the ACM Digital library to identify additional manuscripts. The entire scoping literature review included a full review of 53 articles where I cataloged methods for how to measure and design for reflection.

3.2 Results

3.2-1 Importance of reflective practitioners and a temporal reflection

Social scientist Donald Schön's work advocated for individual professionals to engage in reflective practice to enhance their expertise [152]. Through reflection, he argued, practitioners solve problems, catalyze new theories and improve practices. Schön believed that reflective practice is essential for professionals to adapt to new situations and to improve the quality of their work. His ideas are echoed in the ideas of critical reflection [154] as a method to for exploring "situated knowledge" [39, 71] (Chapter 2.2)

Schön also introduced temporal distinctions within reflection. "Reflection-on-action" refers to retrospective contemplation on past work, allowing for analysis and learning after the fact. In contrast, "reflection-in-action" characterizes the ongoing, active review that occurs during the practice itself. This in-the-moment reflection allows practitioners to adjust their approaches and decisions as situations unfold, fostering a more dynamic and adaptable form of expertise.

3.2-2 Reflective design

Sengers et al. tailored Schön's ideas to technology design by introducing the concept of "reflexive design" [154, 155]. They argued that both technology designers and users should engage in ongoing reflection to create socially responsible technologies [154]. By challenging the traditional view of design as purely functional, reflexive design promoted a more conscious and ethical approach to technology development. These ideas align with Langdon Winner's argument that interventions are inherently political and reflect the broader social, political, and economic contexts in which they are created (Chapter 2.1). Sengers et al. advocated for human-centered design approaches (like participatory design, value-sensitive design, and critical design) to uncover how designers' biases influence their work [154]. As they described, the "provocative nature" of these practices creates "footholds" that can help practitioners see their biases from different angles [154]. Sengers et al. also defined core principles for why designers should include reflection into their practice [154]. The core principles also describe how designers can use reflection to critique their practice and emphasize ways that technology can be used to "enhance" reflection [154].

Sengers et al. also highlighted how ludic design methods can support more accessible technologies by using playful elements to deter interventions that "preach" and thereby bypass potential users [154]. As they note, ludic design views humans as inherently playful beings, where play goes beyond just entertainment and provides a catalyst for learning. As they describe,

> Ludic design promotes engagement in the exploration and production of meaning, providing for curiosity, exploration, and reflection as key values. In other words, ludic design focuses on reflection and engagement through the experience of using the designed object. [154]

By prioritizing curiosity and engagement, they argued that ludic design can support effective reflection by making these practices more approachable. Additionally, Sengers et al. applied ludic design elements when collecting user feedback on a technological artifact designed to promote reflection. As they described,

> ….we **used playful and open questions as an additional strategy to invite more active participation**…. For example, we asked [users] to rate how intimate, embarrassing, and enchanting the [artifact] was on a 7-point Likkert scale — and to pick two other metrics and rate the [artifact] on those metrics… The combination of metrics and ratings gave an opportunity for users to express skepticism to the researchers in their choice of metrics, but hide the offense behind an ambivalent rating, in a manner akin to sarcasm or irony. [154]

The latter part of the quote is especially intriguing because it highlights the potential for a more creative approach to capturing reactions to an intervention, with the possibility of revealing more nuanced, negative or skeptical comments.

Ine Mols et al.'s research is also illuminating in describing which technology-supported modes of reflection sparked the most self-awareness and reflection depth for their participants [114, 115]. Their research focused on "everyday life reflection" which is defined as:

> …deliberate and critical thought processes concerning our day-to-day activities. This includes themes such as work, health, relationships, leisure time and personality. We see value in

> engaging in everyday life reflection regularly, to gain self insight and improve overall well-being. A moment of reflection can bring the mind at ease, provide a feeling of confidence or help solve problems. [115]

In this study, Mols et al. tested different technologies (e.g., photos, videos, digital artifacts) to support self reflection [114, 115]. In one study, they randomly assigned participants to reflect on a recent positive experience by either creating media or retrieving media. The authors asked participants to measure the effectiveness of these modalities to promote self-reflection [114]. Their work found that participants who created content—rather than simply reviewing content—showed greater self-awareness and depth of reflection [114]. They also note that participants noted "lightheartedness" was an advantage, echoing findings from Sengers et al.

3.2-3 Levels of Reflection Model

Rowanne Fleck and Geraldine Fitzpatrick's "Levels of Reflection" work [61] offers a structure for understanding reflection in HCI [15, 18, 124, 125]. The authors synthesized "design for reflection" literature to create a taxonomy that can categorize and differentiate the depth and complexity of a reflective act [61]. The authors define several aspects of reflection, including the importance of knowing the purpose of reflection, recognizing the conditions for reflection and defining the depth of the reflection itself [61].

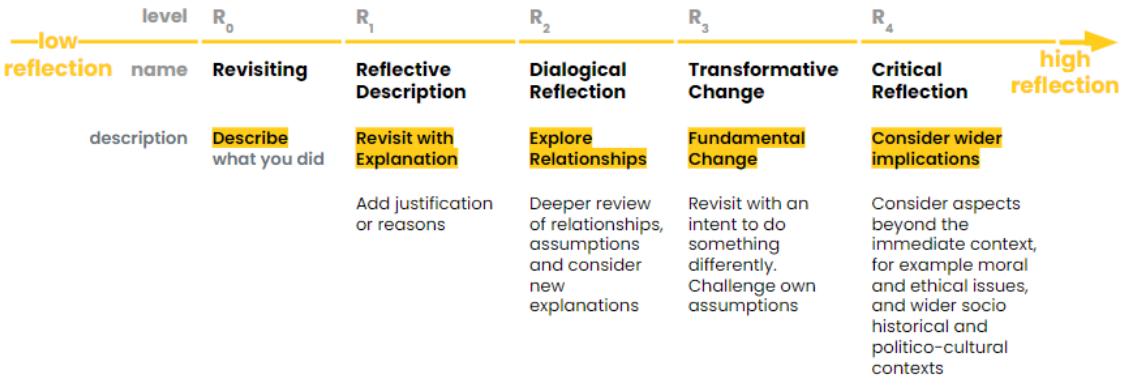
Purpose and conditions of reflection

Fleck and Fitzpatrick also delve into the purposes of reflection, which can range from initiating action, scrutinizing processes, and fostering personal development. Their work highlights how reflection can serve as a springboard for action by prompting critical analysis that supports individuals to learn from past experiences. They additionally highlight the importance of conditions for reflection, like creating the "right environment" to promote reflection. They note the importance of allowing time for reflection, being best conducted "over time and with support." Additionally, as Fleck and Fitzpatrick describe, "reflection is time consuming and not necessarily something that comes naturally to people in all situations, they usually need a reason to reflect or at least encouragement to do so" [61].

Levels of Reflection

Fleck and Fitzpatrick also developed a taxonomy for gauging the depth of reflection [61]. Their model outlines five reflection levels, with "revisiting" (R_0) as the lowest level to the highest level of "critical reflection" (R_4). For instance, a person revisiting (R_0) a vaccine campaign might describe the event, whereas, a critical reflection would consider the biases, cultural implications or sociopolitical context of the intervention. The level of reflection deepens as a person moves from a simple description of an experience to a consideration of the broader context (e.g., moral and ethical issues, and socioeconomic-, historical-, political- and cultural-contexts) (Figure 3.2.3.1). The authors also emphasize the importance of seeing reflection as dynamic and ongoing, where intention, effort, and commitment support a deeper level of reflection. This framework is valuable for understanding and designing interventions that promote deeper reflection.

***Figure 3.2.3.1 Summary of Fleck and Fitzpatrick's Levels of Reflection Taxonomy** [61]*



Fleck and Fitzpatrick extend their framework by exploring how technology can support reflection in HCI design [61]. They propose three key questions to guide designers:

> (1) *What is the purpose of the reflection?* The designer should define the core purpose(s) of the reflection intervention they are designing.
>
> (2) *What reflective behaviours do you want to encourage? Which technologies and techniques can support these behaviours*? The designer should reflect on the Levels of Reflection model and ensure the technology encourages the specific behavior to promote the desired level(s).
>
> (3) *Are the conditions for reflection (time, structure, encouragement) being met?* The designers should look beyond the technology they are designing to think about the setting and contextual factors that will influence a reflection intervention's success.

By addressing these questions, designers can move beyond the technology itself and consider the broader context to create successful reflection interventions. Fleck and Fitzpatrick's work thus provides a valuable foundation for HCI professionals, allowing them to design technology that effectively guides users through the process of reflection [61].

3.2-4 Evaluating reflexive designs

Given the wide variety of interventions that support self reflection [18], from visualizations from wearable technologies [139] to video artifacts [114, 115], there are many ways to evaluate these interventions. For his HCI dissertation research, Pablo Ortiz-Lampier conducted a systematic literature review to understand how HCI researchers evaluate and characterize reflection [124]. His work specifically guided me to the *Learning Activities Survey* as a tool to measure whether reflection provokes action. Bentvelzen et al. conducted a systematic literature review on technology-supported interventions to provoke reflection [18]. Their work illuminated the

gaps in tools and directed them to create a new tool called the *Technology-Supported Reflection Inventory (*TSRI) so the field of HCI can systematically evaluate and compare technology designs [18, 19].

Transformative Learning and the *Learning Activities Survey*

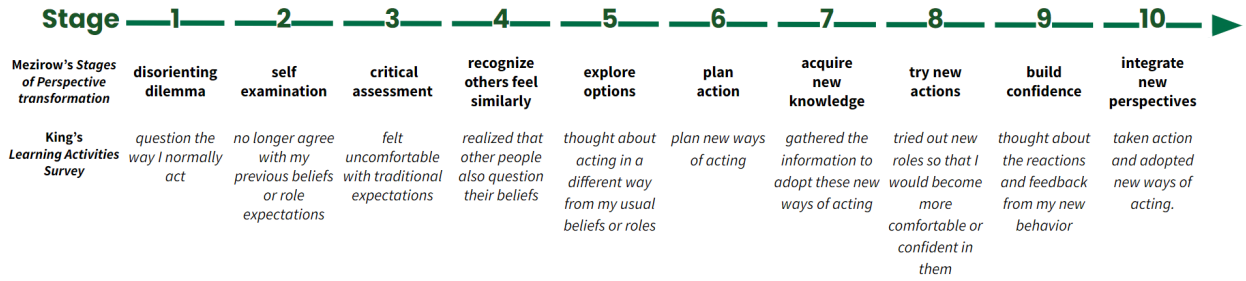
For their theoretical base, Mols et al. used sociologist Jack Mezirow's theory of critical self-reflection to describe the stages of transformation learning [35, 114]. This theory focuses on how our interpretations of our experiences can shift worldviews and lead to personal change [111, 114]. There are 10 steps in Mezirow's transformative learning theory, where a person moves from the first step of experiencing a "disorienting dilemma" to a lasting behavioral change (Table 3.2-5.1). His theory is used widely in HCI research to describe how technology can facilitate learning and personal transformations [14, 18, 19, 35, 38, 61, 114, 115, 125, 153].

Table 3.2-5.1. Mezirow's Stages of perspective transformation [35, 114]

Stage 1: Disorienting dilemma that "throws the learner off balance from their usual perspective and view"
Stage 2: Self examination: with feelings of fear, anger, guilt, or shame
Stage 3: Critical assessment of assumptions
Stage 4: Recognition that one's discontent is shared & the process of transformation are shared
Stage 5: Exploration of options for new roles, relationships, and actions
Stage 6: Planning a course of action
Stage 7: Acquiring of knowledge and skills for implementing one's plans
Stage 8: Provisional trying of new roles
Stage 9: Building competence and self-confidence in new roles and relationships
Stage 10: Reintegration into one's life on the basis of conditions dictated by one's new perspectives

Dr. Kathleen King created the *Learning Activities Survey* to measure changes in Mezirow's transformative learning steps [88, 124, 125]. She designed the LAS to measure student transformation from long-term educational interventions (e.g., a semester-long college course) [68, 88]; however, the LAS has been adapted in many other fields, including healthcare, engineering, and HCI [124, 125]. The LAS uses ten yes-no-unsure questions to categorize a learner's stage of transformation, which moves from the lowest level of questioning their actions, to planning and taking action, and, finally, integrating new actions into routine practice (Figure 3.2-5.2) [88].

Figure 3.2-5.2



For the field of HCI, Pablo Ortiz-Lampier's systematic literature review found that, while many HCI studies lacked direct measurement of reflection, Ortiz-Lampier determined that the LAS was the best tool to measure whether self-reflection promotes action in HCI [124]. Ortiz-Lampier and Harrell then used the LAS to detect changes in participant perspectives after engaging in an "interactive narrative" intervention to promote self-reflection [125].

As they noted, the LAS measured “whether, and to what extent, a perspective transformation had occurred because of a transformative experience” [125].

Methods of cataloging how technology supports reflection

In terms of measuring how people use technology to reflect, HCI researcher Marit Bentvelzen and colleagues conducted a comprehensive literature review of technologies designed to support reflection. This review examined the design of technology systems to support reflection, highlighting a critical gap in research on how technology can effectively facilitate this process [18]. Bentvelzen et al’s work identified several existing systems categorized into two main approaches: those that *capture data about* user behavior and experiences, and those that *offer prompts or reminders to guide* reflection.

This review provides a comprehensive catalog of mixed-methods approaches used to evaluate the effectiveness of technology-aided reflection systems in HCI [18]. It also highlighted a lack of standardized tools for measuring the effectiveness of interactive reflection interventions [18]. To address this gap Bentvelzen et al. then created and validated a tool called the *Technology-Supported Reflection Inventory (*TSRI) [18, 19]. This scale uses three dimensions to describe key qualities of technologies that support reflection: *insight, exploration, and comparison* [19]. The *insight* dimension evaluates whether the technology offers a participant new insights. The *exploration* dimension questions measure the participant’s “ease and enjoyment” of using the system. The *comparison* dimension looks at the social dimension to describe how participants compare their answers to others. Questions in the TSRI are measured using a standard, 7-point Likert scale, from strongly disagree to strongly agree [19]. Through creating the TSRI, Bentvelzen et al. aimed to create a standard tool that could allow for better comparison of technology-supported reflection interventions [19].

3.3 Scoping literature review discussion

Design for reflection is a critical practice in human-computer interaction (HCI) that encourages designers to consider the social, cultural, and ethical implications of their work. There is much to learn from this literature to guide the development and functionality of a reflective tool for global health practitioners, summarized in Table 3.3 below.

Table 3.3. Suggesting for reflective design from scoping review.

Finding	Interpretation
Lack of validated tools to evaluate effectiveness of technologies to support reflection[18]	Using a mixed-methods approach is critical to understand effectiveness of the tool to support reflection, and the Technology-Supported Reflection Inventory may be a new “cross-cutting” quantitative survey relevant to this work
Consider using Fleck and Fitzpatrick *Level of Reflection [61]*	Categorizing the prompts in the prompt library using this framework offers an interesting way to rate each question by the anticipated depth of reflection it could provoke
Ensure to reflect on Fleck and Fitzpatrick design for reflection prompts[61]	Reviewing these prompts at the start of artifact design is critical for designing stronger technologies that support reflection
Consider Likert scales and more open-ended questions [154] from Sengers et al.’s design strategy to “provide for interpretive flexibility” [154]	Here, open-ended Likert scales may generate a useful source of feedback from participants

Finding	Interpretation
Add elements of playfulness from Sengers et al.'s design strategy to "give users license to participate" [154]	Consider ways that playfulness can be incorporated into both the design of the artifact (or intervention) and into research methods
Reflection is stronger when participants create artifacts [114, 115]	Offering participants a way to add to the prompt library along with responding to the prompts within the artifact may spark deeper reflection
Present information back to users from Sengers et al.'s design strategy to "provide dynamic feedback to users" [154]	Creating a public space where participant reflections are posted may offer another modality for engaging in reflection
Consider creating a temporally flexible design [18]	Reflection can be retrospective or prospective, and this tool will not constrain users into a specific type of project
Ensure users are creating something than passively reflecting [114]	The tool should support the act of reflecting rather than just learning about reflection to address Mols' idea "creation has potential to support reflection, by supporting externalizing thoughts and feelings. Reflection can be supported further by requirement briefness or through an adaptive process of creation"[114]
Create a space that provokes both conversation and comparison [18]	Ensure that individual users can learn from their contributions by putting them into conversation with colleagues, and allowing them to compare across responses and ideas
Integrate ideas for "scaffolding" reflection integrating *explicit, social* and *personal* components [157]	• Explicit: learn ways to integrate into practice though the workshops; what are "pause points" in your organization • Social: learn about whether the tool was a good guide overall, and what features (conversation/comparison?) supported feeling seen ○ Explore use of Moderator to address "strong social structures play an important role in creating a safe practicum space"[157] • Personal: describe their motivation to actively engage with and learn from their experience

3.4 Literature review summary

This scoping review explored how design for reflection scholarship from HCI can inform the development of tools that support reflexivity among global health practitioners. The research suggests a mixed-methods approach to evaluate the effectiveness of such tools, potentially utilizing the Technology-Supported Reflection Inventory [19]. Frameworks like Fleck and Fitzpatrick's Levels of Reflection [61] could guide prompt evaluation, while open-ended Likert scales and playful design elements suggested by Sengers et al.l [154] could enhance user experience and candid feedback. There is also evidence that encouraging participants to contribute to the prompt library and share their reflections publicly may deepen engagement [114, 115]. By integrating these elements, a critical reflection tool for global health practitioners can leverage design for reflection principles from HCI to maximize its impact and empower users to engage in deeper reflection.

4 | Creating and refining the *(re)imaginator*

Introduction

This chapter details the design, evolution, and pilot testing of the *(re)imaginator* intervention and workshops. Based on the results of the literature review and other work discussed earlier, I built this intervention using the *Matrix of Domination* as a guiding framework. From my view, centering the design to consider the "multiple levels of domination" could make the tool reach participants across the intersecting axes and levels of power. As Collins describes, generating new knowledge across different roles and levels of power is a key ingredient for change. Her framework made me consider *how* power is consolidated in global health and how to access these levels. It also led me to focus on fostering critical reflection among individual global health practitioners, rather than building a reflection tool that would support groups of people (e.g., teams, organizations, or institutions).

Rationale for focusing on individual global health practitioners

The simplest explanation for why I focused the intervention to guide individual reflection practices, rather than groups of people, is that an individual is the primary unit of change. As described in Chapter 2, building on Donna Haraway's concept of situated knowledge—where individuals cannot fully comprehend another's perspective—individual critical thinking becomes an important driver for change [71]. Said another way, change is driven by individual-level shifts that can emerge from introspection and curiosity about other perspectives. Critical reflection practices offer a mechanism for provoking individual change that can spark reimagination and changes in practice [18]. Sengers et al. reinforce this notion as reflection helps an individual question "unconsciously held assumptions… [and to open] opportunities to experience the world and oneself in a fundamentally different way" [154].

This idea of an individual as a catalyst for change is echoed in business theories like the "diffusion of innovation" [46], "social action," and "practice theory" [81]. While a deep dive into theories from other fields is beyond the scope of this dissertation, the work of entrepreneurial innovation scholars Evelyn Micelotta, Michael Lounsbury, and Royston Greenwood offer a resonant example when describing a mechanism for institutional-level change [81]. As they describe,

> …**practices** are not self-standing categories to be taken as given, but are the **result of endless performances**. It follows that **"individual performances of a practice play a key role in altering a given practice through variation in its enactment"** [102]. For example, new practices and new actors can be initially ignored but may eventually precipitate transformational field-level change. In this scenario, **the seemingly insignificant innovation contributed to altering the interrelations and mutual dependencies among field-level actors**, as indicated by changes in field-level and organizational practices. Critically, escalation occurs when small innovations are theorized and then **become part of the symbolic repertoire of the field**. [81], emphasis my own

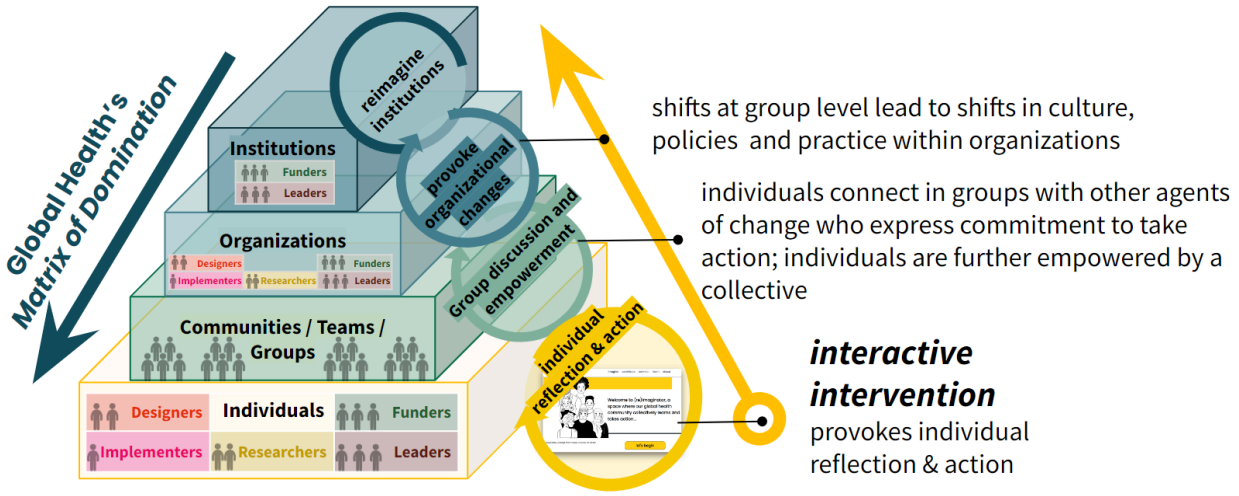
Here individual-level innovations can alter "interrelations and mutual dependencies" within a field and these changes may eventually become commonplace [81]. Much of the change management literature I read highlights the importance of individual innovations as being propelled by social mechanisms, particularly given the interdependencies between individuals within their teams, departments, organization and institutional

structures [80, 81, 135]. For global health, this same kind of cascade of ideas makes sense, where leaders within each structure likely have more "power" to integrate actions sparked by reflection into practice.

In the global health matrix, as previously mentioned, power is asymmetrically held [2, 4, 9, 20, 33, 55, 60, 66, 79, 143]. Funding agencies and large institutions wield disproportionate influence over health system priorities [20]. These organizations, however, are all obviously composed of individual practitioners who have some degree of agency. Collins highlights this by describing such agency noting "… there's always a choice, and power to act, no matter how bleak the situation may appear to be. Viewing the world as one in the making ***raises the issue of individual responsibility for bringing about change***" [39]. Importantly, however, "organizations" cannot act; instead, it is the individuals within organizations who shape and implement policies and programming. While many factors may, in turn, constrain individuals within their organization or beyond, change still rests on individuals who can then reshape their teams, departments, organizations, and institutions.

I developed Figure 4.1 to illustrate how I think about and align Collins' *Matrix of Domination* with the goals of this reflection intervention. The downward blue arrow represents the influence of power, primarily held by funders and institutions, on priority-setting (Chapter 1.1). Figure 4.1 illustrates the desired mechanism by highlighting (yellow arrow) how individual reflection can catalyze up-the-pyramid change. Individual reflection that provokes action can cause a "ripple" effect within teams and organizations. As more and more individual-level decisions begin to disrupt current practices, these become the catalysts to stoke chain reactions that shift the field. Note that when leaders are the drivers for action, the opportunity for change will likely grow as they have control over more structural elements of the organization (e.g., hiring practices, resource allocation, internal policies, and processes).

Figure 4.1. Illustration of the Matrix of Domination** [39] **and opportunity for reflection to catalyze change.

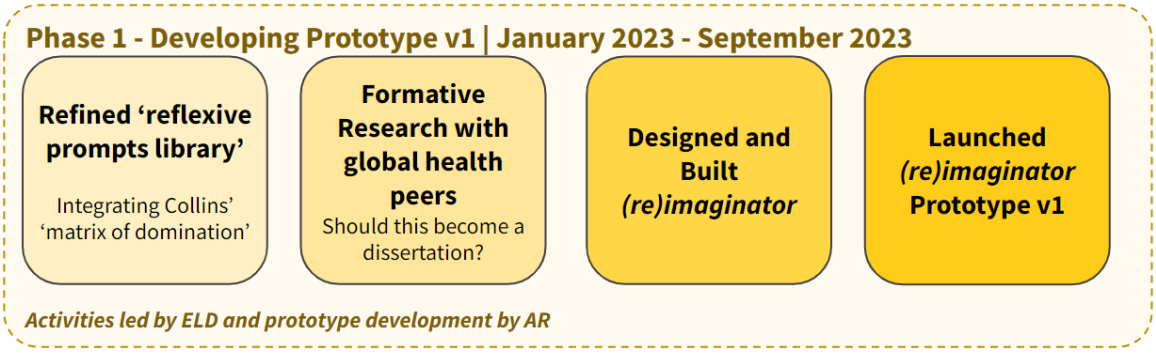


Overview of the two-phase design process

This intervention design process involved two phases. In phase one, I integrated the reflective prompts (Chapter 1) with Collins' *Matrix of Domination* Framework (Chapter 2.4). I aimed to align the intervention's design with Collins' theory for how to dismantle oppressive systems [39] by simultaneously engaging individuals at the different levels of the global health system. I also applied design recommendations from the systematic literature review (Chapter 3) to create the *(re)imaginator* mock-ups. Web designer Alejandro Ruiz (AR) [7, 162] independently developed the website based on the mock-ups. We had many conversations on ways to streamline the designs to support easier development; this was a particularly crucial aspect given AR's voluntary contribution to this project.

At this stage, I also determined the most suitable format for the intervention. While the literature offers various artifact options that can facilitate reflection [18, 35, 38, 77, 114, 125], my experience in global health led me to select a website as the most accessible medium for global health stakeholders. I initially explored the possibility of creating a tangible intervention, such as a card deck or physical artifact. However, I quickly realized the significant challenges associated with this approach. Distributing physical materials to stakeholders, particularly in remote areas with limited mail services, would be costly, time-consuming, and logistically complex. Moreover, creating printable artifacts presented its own set of obstacles. Access to printing is still limited in many regions, and it would require that end users use their resources to print and assemble the intervention. Given these limitations, I focused on developing a digital intervention. The decision to create a website was guided by the fact that approximately 66% of the global population in 2024 has some internet access [82]. Widespread availability of smartphones remains limited, so I opted for a responsive web intervention since it can be accessed through various devices, including phones, laptops, and desktops.

Figure 4.1. Phase 1 activities of (re)imaginator development.

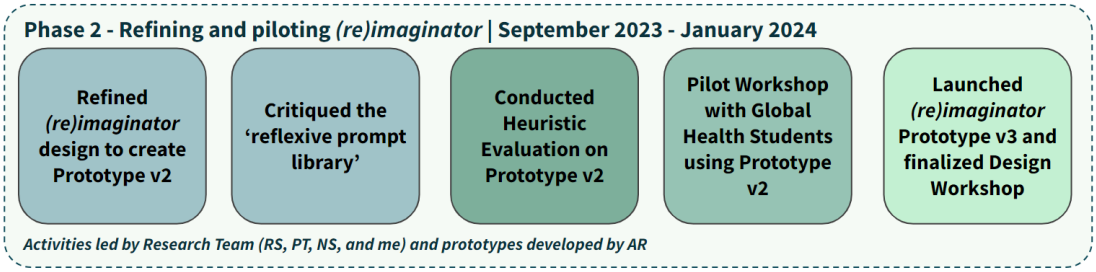


In phase two, Dr. Beth Kolko and I launched a Directed Research Group (DRG) in September 2023 that ran through June 2024 [47]. We advertised this DRG to students in both the Human Centered Design and Global Health departments and sought individuals with qualitative research experience, a background in global health, and a keen interest in health equity. These characteristics were essential for creating a research team who could provide insightful critiques of the intervention and facilitate the research workshops. Our research team was comprised three researchers and me, guided by Dr. Beth Kolko:

- Purva Tekkar (PT)—a researcher from India who was in her first year of the Human Centered Design and Engineering MSc program and with international UX/UI experience
- Raquel Sanchez (RS)—a first-generation Latina with 20 years of healthcare and global health experience in the United States, Uganda, and the Dominican Republic, who was a third-year doctoral student in the Global Health Leadership and Practice program
- Natalize Sulpizio (NS)—a professional health care and service designer researcher working in the United States

Our research team overhauled the intervention design, thoroughly reviewed the prompt library, and conducted both a heuristic evaluation and pilot study to test our changes (Figure 4.2).

Figure 4.2 Phase 2 activities of (re)imaginator development



4.1 Phase 1 | Developing Prototype v1

4.1-1 Restructuring the reflective prompts library

The ***reflective prompts library***, initially created from readings of my PhD coursework (Chapter 1.2.3), became the core of the intervention design. Recognizing the potential of using Collins' *Matrix of Domination* framework [39] as a way to approach dismantling the oppressive structures in global health (Chapter 2.4, I began to restructure the prompt library to reflect her framework. This framework helped connect specific professional roles with the levels of power in the field of global health.

Collins describes the importance of working simultaneously across ***individual***, ***community*** and ***institutional*** levels. In global health these levels resonate with how we typically refer to our professional roles. At the *individual* level, global health commonly differentiates roles based on how they contribute. With a goal of having the reflection questions better resonate and align with the specific responsibilities of global health practitioners, I created and defined several "sublevel" categories to align with commonly held professional roles (Table 4.1.1). Like technologies, health interventions are designed, implemented and evaluated, so I differentiated between these three roles. I also added a community to support those who receive health interventions to share their reflections. Finally, I added a category for leaders and funders who set guidelines and control funding (Chapter 1.1).

Table 4.1.1. Matrix of Domination Levels associated with common global health professional 'roles'.

***Matrix of Domination* Level** [39]	**Sublevel categories** definition	**Examples**
Individual	**Designer** *Individuals who develop, define and design health system interventions*	Project or program designer, technology designers, policy writers, intervention creators, clinical protocol writers,
	Implementer *Individuals who deliver health interventions*	Nurses, Community Health Workers, Doctors, Program Managers, Project Managers, etc.
	Researcher *Individuals who evaluate and research health systems and interventions*	Evaluators, Researchers, Principal Investigators, Research "data collection" team members
	Individual *Individuals who work in global health but do not identify with a category above*	Any individual working in global health who does not identify with category above
Community	**Community Member** *Groups of people who receive health interventions*	Any group of people who receive health intervention, like patients, patient organizations, communities
Institutions	**Funder** *Organization who funds global health systems or research*	Government officials, Foundations, Large funding bodies, Research funders
	Leader *Overarching health institutions who set policy, guidelines, priorities*	Governments, World Health Organization, etc.

How these roles align with project lifecycles

Importantly, like Human Centered Design, many global health practitioners have different roles based on the program or project they are implementing, and commonly hold multiple roles. For example, an evaluator might also be involved in the design and implementation of a project. These roles frequently align with the project lifecycle, from inception to evaluation. Thus, these professional roles can also resonate with project lifecycles. Notably, while many roles are project-specific, the Community, Funder, and Leader categories encompass broader, cross-cutting perspectives that are relevant throughout the project lifecycle (Table 4.1.2). The corresponding roles within the intervention can also speak to this temporal project setting. This is notable as the intervention can be used at any project stage and remains relevant for the key stakeholders. Note that the Community, Funder, and Leader roles have questions that target their cross-cutting involvement over time, depending on the project.

Table 4.1.2. Connecting roles to project life cycles across the fields of design and global health.

Discipline	**Project steps over time (from project inception to evaluation) and alignment with roles**					
HCD Steps [113]	**Ideation**	**Discover**	**Define**	**Develop**	**Deliver**	**Research and evaluate**
Global Health Project Management Steps [161]	**Prepare**	**Requirements analysis**	**Design and build**		**Implement**	
Corresponding Role	**Designer** develop and define interventions				**Implementer** deliver interventions	**Researcher** evaluate interventions
	Individual - Individuals working global health who do not identify with above roles					
	Community Member - who guide and receive health interventions					
	Funder - fund interventions					
	Leader - government leaders or representatives from core global health institutions					

Tagging prompts with specific roles

I then revisited the prompt library to tag each question with the corresponding role or roles. Many questions served multiple audiences, so were tagged accordingly (Table 4.1.3). Note that the “implementer” category is missing from this tagging as many of the prompts would be repeated. This revised library serves as the basis for the dissertation work, where the reflection questions are organized to guide specific stakeholders in reflecting on questions that should align and prompt them to reimagine specific roles and work.

TABLE 4.1.3. Screenshot of the original table of reflexivity prompts drawn from HCI and global health literature, and organized by Collins' Matrix of Domination framework categories of prompts for individuals, communities, and institutions.

Matrix of Domination Category | Question	**Source**
Individual - Individuals working global health who does not identify with above roles	
What are the individual, community > structural layers of power?	Collins, 1990 [39]
What is progress for?	Dinerstein, 2006 [50]
How might my sense of urgency be impacting this project? Whom may I be leaving behind given my sense of urgency?	Hamid, 2020 [70]
What are the political arrangements underlying my work? How might funding, academic, industry, police, government interact?	Hamid, 2020 [70]
What am I committed to in this project or program?	Hamid, 2020 [70]
What am I refusing to compromise on (and why)?	Hamid, 2020 [70]
What am I building towards?	Hamid, 2020 [70]
How have I inserted myself into a community?	Harrington et al., 2019 [72]
How might I diversify my ways of knowing for this project or program?	Collins, 1990) [39], Hamid, 2020 [70]
How might this project or program reinforce power structures?	Hamid, 2020 [70]
How might it liberate or give people the ability to "live and to thrive"?	Hamid, 2020 [70]
Am I thinking about this community as a "blank slate" or have I acknowledged and learned about the deep and long history?	Easterly [55]
Examine the "three obstacles" that may limit your ability to anticipate consequences of the intervention…. 1. Ignorance: what are the limits in my knowledge? Am I able to predict the outcomes of action with certainty? Can I predict the complexity? 2. Error: Have I appraised the situation right? Were there errors in identifying the range of possible actions available? Were there errors in the assumptions that actions that have been previously done and secured specific outcomes will be appropriate in this new situation? 3. Ideological commitments: have I excluded consideration of other ideologies or commitments?	Parvin & Pollock, 2020 [131]
Designer - develop and define interventions	
Whose voice is strongest? Whose voices are missing?	Friedman & Hendry, 2019 [62]
Did this design engagement support "imaginative freedom" among those who see creativity from a different lens?	Harrington et al., 2019 [72]
What are the gray areas in this technology space? How am I falsely dichotomizing the "problem"?	Haraway, 1988 [71]
How might new ways of knowing illuminate the problem space differently?	McKittrick, 2020 [107]
How might art or movement illuminate this area?	McKittrick, 2020 [107]
What structural issues could this technology perpetuate?	Benjamin [17]; Collins [39]
How might I be pretending that "technological innovation" always connotes linear progress?	Dinerstein, 2006 [50]
How might this work connect with US/Western mechanisms? In other words, are there ramifications working in "low-information environments" that could be taken advantage of (e.g. police technology being repurposed abroad)?	Hamid, 2020 [70]
What values may be encoded in this technology?	Birhane et al., 2021 [24]; Friedman & Hendry, 2019 [62]
In HCI and UX, we have to ask not just "Does X technique or approach work in Y context?" but also "What are all the consequences of applying X techniques or approaches in Y context, and *should* we do that translational work?"	Churchill, n.d. [37]

Matrix of Domination Category | Question	**Source**
How might we see that translation is about creating shared meaning, and reflect on where meaning is not shared?	Churchill, n.d. [37]
How do we acknowledge challenges of economic disadvantages in design engagements?	Harrington et al., 2019 [72]
How do we acknowledge the labor required to build trust?	Harrington et al., 2019 [72]
We posit that a substantive change is needed in how CSCW technologies interpret issues of inclusion, exclusion, marginalization etc. Toward a sustainable shift, CSCW and HCI need to be more grounded in structural analysis of oppression, i.e., moving our investigation from "who is missing from technology discourse" to "why are they missing? How are they missing? What needs to be transformed structurally in order to dismantle this pattern of exclusion?"	Ghoshal et al., 2020 [63]
Do the technical solutions we create possess the risk of becoming a solution that works for a selected few in the community?	Ghoshal et al., 2020 [63]
Researcher / Evaluator - evaluate interventions	
When disseminating the findings, what successes am I personally benefiting from? How may this impact my career?	Pierre et al., 2021 [133]
What am I investigating—and on whose behalf? How do I balance my obligations to the various institutions and individuals involved? Who owns the data I collect?	Greenhalgh & Russell, 2010 [67]
How might we disseminate these findings in new ways so that the participants, community, or institution involved may find them insightful and/or actionable?	Pierre et al., 2021 [133]
How do we acknowledge the power dynamics between researchers and community partners?	Harrington et al., 2019 [72]
When disseminating findings, how might I acknowledge or not acknowledge stakeholders? This requires careful consideration of who is or should be made visible (i.e., recognition)and whether these individuals are even willing or desire to affiliate with design practices.	Harrington et al., 2019 [72]
What are the steps that can be taken immediately following a design engagement such that the impact is immediately perceived?	Harrington et al., 2019 [72]
What are the resources that already exist and can be leveraged and supported, such that they can be maintained and progressed in the absence of researchers?	Harrington et al., 2019 [72]
How might I be biased towards observability? How might I expand my ways of knowing?	Easterly, 2014 [55]
Community - who guide and receive health interventions	
When disseminating the findings, how will we want to credit stakeholders and participants? This requires careful consideration of who is or should be made visible (i.e., recognition)and whether these individuals are even willing or desire to affiliate with design practices.	Pierre et al., 2021 [133], Harrington et al., 2019 [72]
Do the technical solutions we create possess the risk of becoming a solution that works for a selected few in the community?	Ghoshal et al., 2020 [63]
What assets do we have that we should leverage and/or expand upon?	Harrington et al., 2019 [72]
How do we acknowledge the power dynamics between designers, researchers and community partners?	Harrington et al., 2019 [72]
Institutional / Funder government leaders, representatives from core global health institutions, and funding orgs	
What are the steps that can be taken immediately following a design engagement such that the impact is immediately perceived?	Harrington et al., 2019 [72]
How might this project or program reinforce power structures?	Hamid, 2020 [70]
How might it liberate or give people the ability to "live and to thrive"?	Hamid, 2020 [70]
For funding institutions, see the list of questions in SSRI's recent article Trust the people: https://ssir.org/articles/entry/trust_the_people	Strode and Morris, 2021 [158]

4.1-2 Formative research with global health colleagues and peers

To further refine and validate the restructured prompt library, I conducted formative research with global health colleagues and peers. This phase aimed to discern how to explain critical reflection to global health practitioners and understand perceptions of if/how reflection could have utility in the field.

Sharing with global health colleagues

Dr. Nancy Puttkammer, my supervisor and a member of my dissertation committee, suggested I share the concept of reflexivity and the reflective prompts library with my colleagues during our weekly, one-hour team meeting. Eleven of my colleagues attended the team meeting, including both graduate students and our full-time staff. To make this session more engaging and to begin to understand how to "package" these questions, I displayed all 22 question prompts on one screen using a Figma JamBoard and organized the questions using the *Matrix of Domination* categories. I used the levels from the *Matrix of Domination* ('individual', 'community', and 'institution') and added in the sublevel of project roles (Table 4.1-1).

I asked colleagues to 'think about their current projects,' then browse the Figma JamBoard and react to the prompts with pre-determined emoji stamps (Table 4.1.2-1). At the end of the session, I asked participants to share their input and feedback and rate the overall idea of this project.

Table 4.1.2-1. Emoji reaction stamps and their definitions, and a screenshot from FigJam Board showing the emojis.

Emoji	Definition	Screenshot of the emojis on the FigJam board
❤️	Very provocative prompt	
👍	Provocative prompt	
👎	Not a provocative prompt	
❓	Did not understand prompt	

My colleagues reacted to 53% (29 of 55) of the reflexive question prompts during the 30-minute exercise. Community-level and Institutional level prompts had the highest proportion of reactions, with Table 4.1.1-2 showing the most popular prompts. Intervention evaluator roles had the fewest reactions, likely related to the roles of the participants as only a few identify as academic researchers. Given that participants were asked to react to cards related to their projects and work, note that 21 of the 29 cards with reactions had only *one* reaction. In other words, 73% of the cards had only one emoji reaction from the 11 participants limiting any interpretations of the most popular prompts. Participants also added five cards to the board, one new question in each role. There were no negative reactions (thumbs down) to any of the prompts and only one question mark on the card, "How can art or movement illuminate this area?" [107]. The table below shares the most popular prompts for each category, where there were two or more reactions to the prompts. Of the 31 cards that had any reactions, only 8 of them (Table 4.1.2-2) had more than two reactions. Of these, four emerge from Harrington et al. paper *Deconstructing Community-Based Collaborative Design: Towards More Equitable Participatory Design Engagements* [72].

Table 4.1.2-2. Most highly ranked (or popular) question prompts by category.

Categories and most popular question prompts	Count of Positive Reactions
Individual Level Prompts	
How do we acknowledge the labor required to build trust? Harrington et al., 2019[72]	3
Am I thinking about this community as a "blank slate" or have I acknowledged and learned about the deep and long history? Easterly, 2014[55]	2
How can my sense of urgency be impacting this project? Whom may I be leaving behind given my "sense of urgency"? Hamid, 2020 [70]	2
What are the political arrangements underlying my work? How can funding, academic, industry, police, government interact? Hamid, 2020 [70].	2
Community level Prompts	
What assets do we have that we should leverage and/or expand upon? Harrington et al. , 2019[72]	4
How do we acknowledge the power dynamics between designers, researchers, and community partners? Harrington et al., 2019[72]	2
When disseminating the findings, how will we want to credit stakeholders and participants? Pierre et al., 2021[133]	2
Institutional level Prompts	
What are the resources that already exist and can be leveraged and supported, such that they can be maintained and progressed in the absence of researchers? Harrington et al., 2019[72]	3

The session ended with a brief discussion about whether meeting participants would use a tool like this. I asked participants for perspectives interacting with these question prompts. Overall, my colleagues provided feedback on the idea (Table 4.1.2-3) and expressed interest using reflection in their global health work. They supported the idea of turning these prompts into a tool, with encouragement for a website so it could be accessed globally. It is important to note the likelihood of social desirability bias since I worked with all participants. Though I asked for candid feedback, my colleagues did not share any specific negative feedback. They did, however, encourage more exploration and research on this topic. One colleague gave more specific feedback on the future form and function of a reflection tool:

> [I] like the idea of turning this into a 'tool' — would likely want to reduce the number of questions further. To consider: What do we do with the answers? Particularly for the questions that are more self-reflective, how can we use the information to improve? There are so many "checklists" that exist in project planning. How do we make them meaningful?

My colleague suggests simplifying the reflection tool by reducing the number of questions and a focus on creating a tool to support actionable outcomes. They emphasized the importance of transforming self-reflective data into practical improvements. This feedback highlights the need for a tool that not only gathers insights but also drives positive change.

Table 4.1.2-3. Summary of findings from early pilot of the reflection prompts.

Finding	Interpretation
Participants added new prompts to every category	Giving end users the option to add question prompts can diversify the content beyond questions from only academic sources (e.g., global-health-specific prompts from practitioners and ideally community members) Adding questions may also serve as an additional outlet for engaging with reflexivity in that participants create or share additional provocations for colleagues.
Diversity of prompts is important	Noting that 37% of the question cards only had one person reacting, this indicates that a diverse library of reflection questions is important given the variety of projects, roles, and interpretations. In other words, one question may not be relevant or useful.
No negative reactions	There are many potential reasons for a lack of any negative reactions to the cards or to the project as a whole, including: ● A card topic not being relevant to a particular person's project, yet they would rather not react negatively; ● Social desirability bias given that I am a colleague and this exercise to rate prompts was done on a FigJam board where participants could see all of their colleagues' cursors.
47% of cards had no reaction	Cards without emoji responses may mean that participants skipped over the card (did not read) or that they did not find it relevant. Consider making a "forced choice" in the web artifact to gather information about which prompts are not useful. Consider also thinking more carefully about the labels for how end users react to prompts.
Recommended website	Participants also recommended building a web artifact to diversify accessibility across contexts where we work (noting that apps and other hands-on tools, like card decks, would be harder to access).
Consider a website as the primary artifact	Participants thought moving the prompts to a website would be the most accessible format for our global health community.

Sharing with global health peers and scholars

This workshop with my work colleagues prompted me to consider how this concept might resonate with other global health practitioners. I sought peers, former colleagues and a few global health scholars (referred to hereafter as 'practitioners') to share their feedback on the ideas.

Overall, practitioners expressed enthusiasm for this project and encouraged further exploration. They acknowledged the lack of tools to guide the process of decolonizing and reimagining global health. However, they also recognized that while having a tool for this purpose would be valuable, this tool would only be part of the work needed to disrupt the status quo.

Practitioners found the term 'reflexivity' difficult to grasp and somewhat alienating. Instead, they suggested using more accessible words like 'reflection' and 'review' to describe this action within our community. They also noted 'after action reviews' [45, 98, 129] are a common practice in our field and could be leveraged to describe this process. Many conversations also noted the importance of broadening the reflexive question library to go beyond academic articles. A few discussions mentioned the importance of engaging with a broader group of global health stakeholders (e.g., communities, governments, non-profits) to include new epistemologies and

questions. There was also support for adding a feature of the website where people could recommend new prompts.

The major topic emerging from these conversations was thinking about how tools could stoke changes in behavior and practice, and how these changes could be measured. There was much discussion around the embedded power structures in global health and methods of measuring power disruption and behavior change. While supportive of reflection, participants noted that just having a tool to support global health practitioners, would be "necessary but insufficient" to change practice. They speculated ways of how reflection could get integrated into practice, for example discussing how reflexivity could be added to processes like grant applications, research proposals, Quality Improvement projects, and required reports to funders. They also noted how to get this integrated into existing communities, leveraging, for example, the recent crop of "Diversity Equity and Inclusion" working groups that many global health organizations now support.

This formative research phase solidified the idea of turning this idea into dissertation research. I shared this research proposal as part of the 2022 Designing Interactive Systems doctoral consortium as a paper "Developing Critical Reflexivity in Global Health" [54].

4.1-3 Designing and building *(re)imaginator* Prototype v1

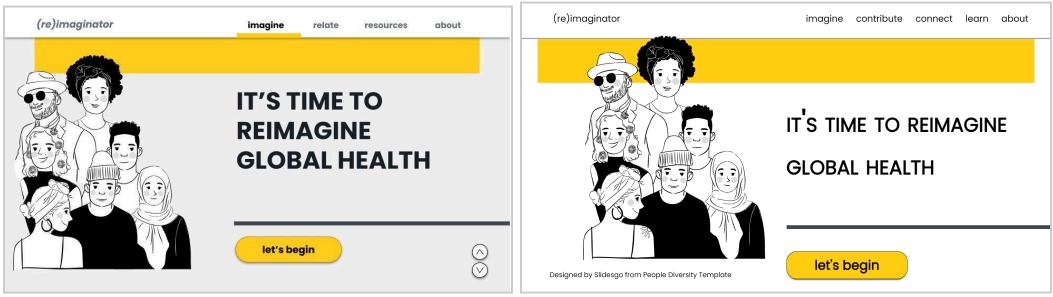
Designing for individual use and applying Ludic design elements

Inspired by HCI researcher Phoebe Senger et al. work [154] (Chapter 3) on ludic elements, I approached the tool development with an idea to make the daunting task of reflection more accessible through lighthearted and playful design. I chose a bright color palette to start, using yellow as a main highlight as it is commonly associated with positive emotions such as sunshine, happiness, optimism, and energy. Yellow is also quite attention-grabbing. A second ludic design element aimed to promote curiosity through "reimagining" the field rather than asking individuals to decolonize their minds or reflect. This catalyzed the idea to name the intervention *(re)imaginator*, a mashup of the word "reimagine" with the suffix "-ator" to draw on the idea of a person doing the reimagining with support from a "machine" (or the digital intervention itself). Finally, the design also leveraged an idea from the Magic 8 Ball [104], where the toy reveals a question at random that floats to the surface slowly prompting curiosity and intrigue. Thus, I started thinking about how questions could slowly appear to the user in a random order as they clicked through the site.

Designing the mock-up and creating functional Prototype v1 website

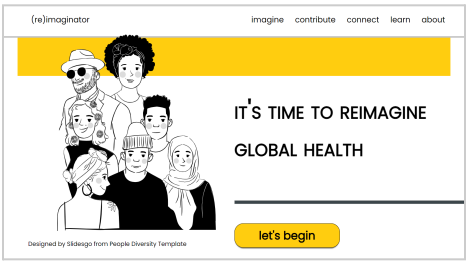
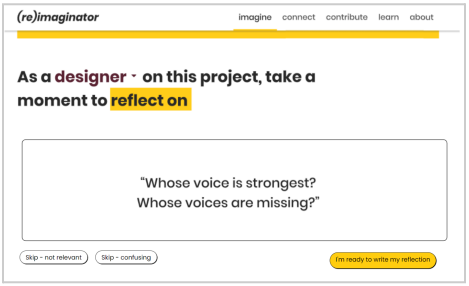
I first created a low-fidelity mock-up using a Slides.go template [156]. This mock-up supported quick website refinements, including refining the roles and website colors. Early in the product development, I shared these mock-ups with the research team and sought informal feedback from a diverse group of global health practitioners to fine-tune the format and structure of the tool. Web designer Alejandro Ruiz (AR) used these mock-ups to build Prototype 1 (Figure 4.1.3-1).

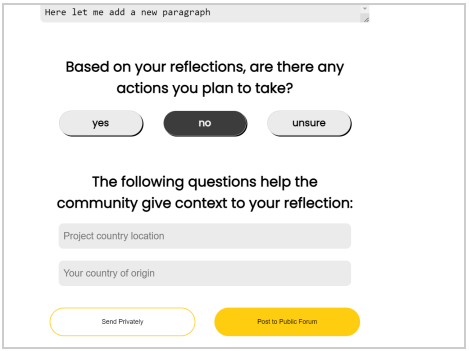
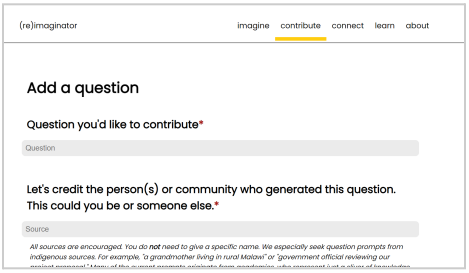
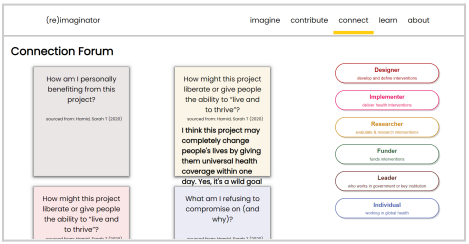
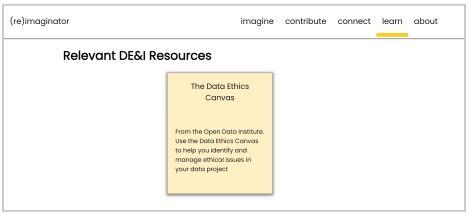
Figure 4.1.3-1. Side-by side views of the (re)imaginator mock-up in the SlidesGo template and Prototype v1 website home screen.



The *(re)imaginator* is designed to offer multiple ways to reflect, as recommended by Mols et al. research [114]. The website leverages both the active and passive processes of reflection, noting Mols et al. recommendation that active reflection is more effective in generating self-awareness and depth of reflection [114]. After seeing a single prompt in the imagine section of the website, a global health practitioner can reply to the prompt and post on a public form, without their name or identifying their organization (Table 4.1.3-1). The public posting would allow other practitioners to review responses to support Bentvelzen et al. recommendation that technology-supported reflection intervention should encourage a social element ("comparison") to allow participants to see their peers' reflections [19].

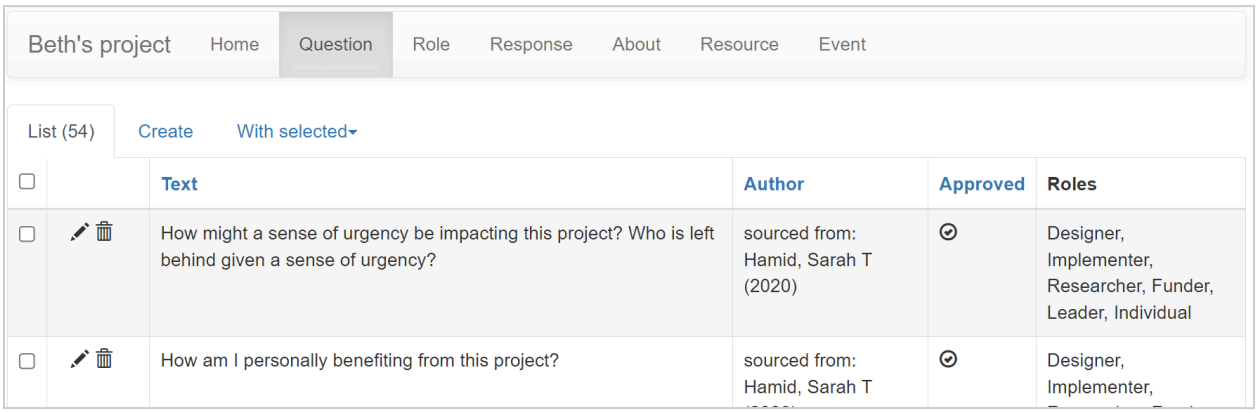
Table 4.1.3-1. Description of the page sections of the (re)imaginator intervention.

(re)imaginator page name design rationale	**Prototype 1.0 Mock-up**
Home page This welcome page invites a user to begin the process of reimagination.	
Imagine scrolling through question prompts Users can scroll through various prompts related to the specific role they chose and select a prompt to respond to. The scrolling buttons below the prompt will also support further refinement of the prompt library questions as users can mark the questions "skip - not relevant" or "skip - confusing" allowing us to measure question utility and clarity.	

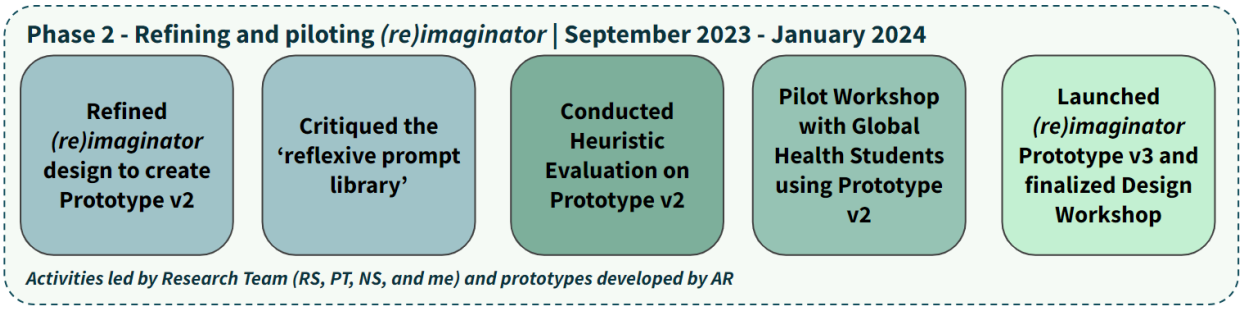
(re)imaginator page name design rationale	**Prototype 1.0 Mock-up**
Imagine page *to respond to a prompt* This section promotes active reflection on the specific question prompt a user selects. It also asks whether the user will take action based on their reflection.	
Contribute page *to add a question* Global health practitioners may also contribute by suggesting new reflective prompts that could be added to the library. Opening the ability to contribute question prompts gives a global health practitioner an additional way to reflect while also aiming to diversify the question prompts given that the current catalog is from academic literature.	
Connect page *to review others' reflection posts* This page displays reflection posts and allows a user to filter the reflections by the role category. This page leverages the passive process of reflection by allowing users to engage with and read another global health practitioners' post.	
Learn page *to see potential useful* During this project, I found many Diversity, Equity, and Inclusion resources that could be supportive to global health. I put these in a resource library. This library could be used to prompt action but was not an integral part of the research intervention.	

The website also has a back-end administrator interface where roles, question prompts, and responses can be uploaded and refined. This interface allowed me to adapt and amend the *(re)imaginator* content based on designs without requiring a developer. For example, the *Question* page of the back-end interface displays all question prompts uploaded to the website along with their sources and assigned roles (Figure 4.1.3-2). If a user submits an additional question from the contribute page, the suggested prompt will be displayed in this table. I can then review and, once approved, it will be immediately available on the *(re)imaginator* frontend.

Figure 4.1.3-2. Screenshot of the (re)imaginator back-end page where prompts are added.



4.2 Phase 2 | Refining and piloting *(re)imaginator*



4.2-1 Refining *(re)imaginator* design

The research team began to critique the Prototype v1 website. The team considered the goals of the website and iterated on design ideas. After several discussions, the professional designer (NS) mocked up a Figma redesign to help critique the flow. The research team iterated on these designs, and shared them with the software developer (AR) to scope functionality for ease of build. The redesign was an iterative process over many weeks with mock-ups and discussions of Prototype v1. We summarize the key design changes below.

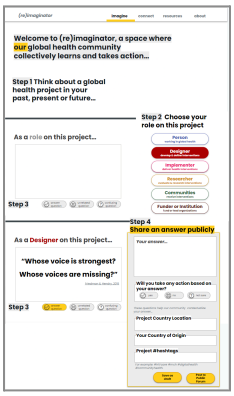
Updated the workflow

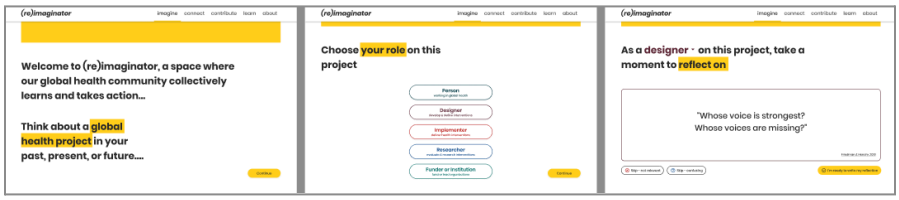
The original concept of one long scrolling page was updated to a stepped flow to aid in the usability of the *(re)imaginator* (Figure 4.2.1-1). Both the Heuristic Evaluation and pilot workshop participants identified the long scrolling page as confusing, so in Prototype v2 we converted the interactions into stepped pages. We chose this design to break down usage into manageable steps to reduce cognitive load and guide the user through the steps like a storyboard. Additionally, creating the stepped break forces natural pauses in the flow as the next page loads and gives a moment for the user to process. We also included clear navigational cues, in repeating patterns, to reduce the navigational cognitive burden and encourage users to maximize their mental space for reflection rather than struggling with the website. Additionally, these stepped interactions also supported

removing the original pop-up window that captured reflections in v1, and this change also promoted better accessibility.

Figure 4.2.1-1. Original long-scrolling page with the pop-up window displayed versus Storyboard of stepped interactions.

Prototype v1 long scroll	Storyboard design with stepped interactions





Adjusted question navigation buttons and ordering

Since the questions are displayed one-by-one, users need to select whether they want to answer a question or see another question option. We opted to overhaul the selection buttons for clarity. Instead of using icons, we opted to write out the three options for a user: “skip” to see another prompt option, “skip - confusing” to see another option yet flag the current question as confusing, and “I’m ready to write my reflection” to move to the final step. The original iconography made it seem like a user was being asked to rate the question itself rather than being an invitation to see another idea or respond.

Additionally, we modified the website to store previously asked questions in the URL query string to avoid repeating questions during a user’s session. While in Prototype v1 prompts were randomly selected, this update enhanced metric validity by ensuring users do not skip questions they have already encountered or reflected upon. These updates also helped assess the popularity of prompts and identify those most frequently skipped. We also hoped to use this information to identify question prompts that may be perceived as "confusing," prompting reconsideration of their inclusion or wording.

Added private post option

We also opted to add a “private post” option so a user could select whether they wanted to share their reflection privately or publicly post on the *connect* page. We wanted to give users the choice for whether they would want to display their reflection. We thought this flexibility may allow practitioners to be more candid in their reflections. We also thought this feature was important as our research workshops would be conducted with groups of colleagues and synchronous posting could make a participant’s post more identifiable. We also wanted to gain more insights on user preferences on whether they would feel comfortable sharing their posts.

Optimized for low-bandwidth settings and mobile devices

To make this website as device- and location-agnostic as possible, AR optimized Prototype v2 for low-bandwidth and mobile use. Sites across the web are steadily getting heavier, making website pages slower to load [78] as today's average website is over 2 MB [78]. This can be an obstacle for users with low internet bandwidth. We used a server-side, templating library to keep most of our page loads between 200KB and 400KB. We also made minor design adjustments to the screen designs to optimize for both computer and mobile devices, again to support accessibility. Though ultimately the tool is best viewed on a computer, it does function on handheld devices like smartphones.

4.2-2 Critiquing the 'reflexive prompt library' with a modified Delphi Consensus

Our research team then reviewed and critiqued the prompt library using a modified Delphi Consensus approach [85], with the following goals:

- Ensure that the prompts are self-contained and clear, eliminating the need for users to engage in additional reading or interpretation to respond to the questions.
- Improve readability by minimizing the use of academic jargon and acronyms in the prompts.
- Preserve the connection to the original sources to uphold proper attribution of the prompts.
- Achieve consensus on question categorizations for both the specific professional roles.
- Agree on the Level of Reflection category for each question to categorize the expected level of critical reflection that each question may provoke.

Over four weeks, we conducted four rounds of review for each of the 63 prompts in a consensus-driven process. We worked towards consensus on whether to include the prompt in the library and if so, then the team worked on the wording of each prompt. The consensus process was important to ensure these prompts could stand alone and had the potential to provoke global health practitioners to reflect on their work when using the tool. The goal was to reduce the need for global health practitioners to do additional reading or interpretation of the questions and for the questions to be "stand-alone" to provoke reflection. Our team also enhanced question readability by minimizing academic jargon while maintaining attribution to original sources.

In the first review round, three members of the research team each independently reviewed 21 questions from the set of 63. We examined each question and assigned one of four review categories: "looks good" to mean the question was well-phrased and could be kept as is, "changes proposed" to suggest their modifications to the question phrasing; "irrelevant" to show the question appeared irrelevant to the intervention goals; and "Beth to review" to recommend that I revisit any question deemed confusing by research assistants. All researchers reviewed all questions, regardless of their category, until we formed consensus on their categorization.

Additionally, as part of the content analysis, our research team also used the modified Delphi Consensus approach [85] to categorize each prompt with the level of reflection from Fleck and Fitzpatrick's model [61]. By systematically tagging each reflective prompt in the catalog with these levels of reflection, it may be possible to understand the depth of reflection that global health practitioners prefer to respond to while using the intervention. This approach could enable insights into reflections patterns and propensity of engaging in 'critical reflection' the depth of their reflection. For the *(re)imaginator*, systematically agreeing to and tagging the expected level of reflection for each prompt offers a way to analyze and gauge the "depth" of reflection based on the questions global health practitioners select for their reflections.

Eliminating the “community” category

During the question review process, we debated whether to include the “community” category in our research and in the reflective prompt library. Our discussions centered on whether we could meaningfully and should work with community members. While we noted the desire to and importance of involving patients and community members in our research, we determined that conducting community-based research was both impractical and unethical. Factors such as limited research resources, logistical impracticalities, and the challenge of developing culturally appropriate materials contributed to our decision. There were only three question prompts relevant to community members in the *reflective prompt library* so firstly the library would have needed to be expanded. Our team also recognized that piloting with community members would require translating all content into other languages and then undergo peer review to ensure clarity, cultural relevance, and accuracy of these translations. Finally, given the history of exploitive research in many communities [2, 21, 142], we were concerned about the ethical implications of involving community members in our research. This intervention has very limited direct benefits to community-based participants as we did not have funding for financial participation incentives *nor* would this research improve their health care system. We also noted that engaging community members would require in-country ethics approvals that can take months to years for approval.

Thus, we opted to remove the “community” category and the three associated questions. Notably, the website Loop [101] actively collects community and recipient feedback for humanitarian organizations and could serve as a useful model for reflection tools. For the scope of this initial research, this intervention will initially target only global health professionals recognizing the immense opportunity given the power differential and noting that these practitioners drive defining, implementing, researching, and funding interventions.

Applying the modified Delphi consensus

Four members of our research team (NS, PT, RS, and me) revised a total of 34 prompts to improve clarity (Table 4.2.2-3) using the modified Delphi consensus process. For example, we rephrased the question “How can I diversify my ways of knowing for this project or program?” to “What new sources of knowledge can I seek to diversify my thinking about this project?” We also rewrote questions that would elicit a binary “yes or no” response to prompt users to engage in more nuanced and reflective thinking. For example, we rephrased “Am I thinking about this community as a ‘blank slate’” to “How am I thinking about the community impacted by our intervention or project as a ‘blank slate’?” We identified two questions as excessively lengthy, and we subsequently divided these into four separate prompts. I reviewed all prompts tagged “PI to review” by revisiting the original sources to reassess the author's concepts and attempted to rephrase for both clarity and accuracy. Then the research team reviewed these modified questions for inclusion. After the four rounds of review, we included 54 prompts in the intervention, including 34 prompts where the questions were updated and 20 where the original questions were retained.

Table 4.2.2-3. Total questions reviewed, by the initial categories from the students and the final categories.

Review Categories	Student initial review	Final Categories
Look Good keep question as originally written	**22**	**20**[2]
Changes Proposed[1] Changes to questions	**14**	**34**

Review Categories	Student initial review	Final Categories
Irrelevant Questions to remove	**0**	**13**
PI to Review Revisit original text	**27**	**0**
Total question prompts reviewed	**63**	**65**[3]

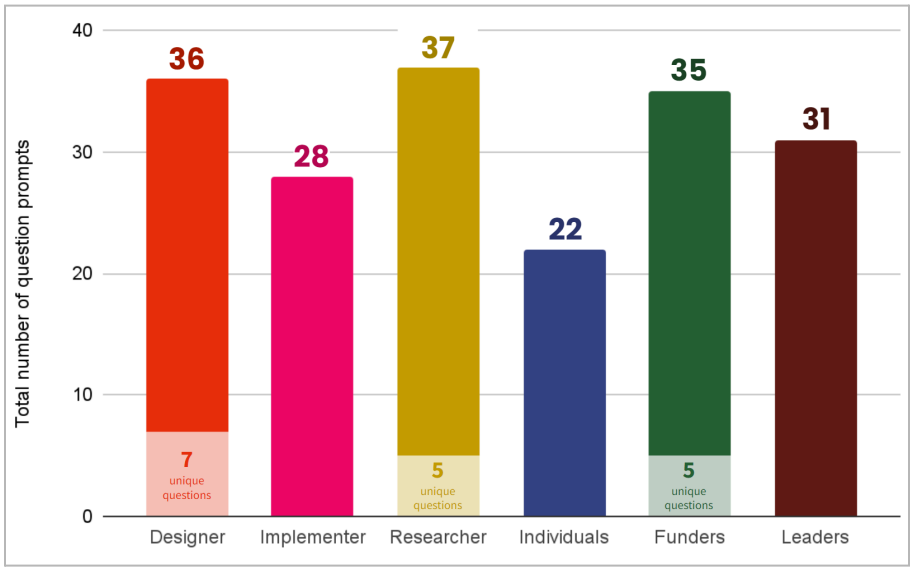
[1] "Changes Proposed" was the name of the categorization selected by students, for the Final Results column this means the number of questions that were rephrased and updated based on group consensus.

[2] Two questions revised during the group review given initial lack of consensus, thus moved to the "Changes proposed" category

[3] Two questions from of the original prompts were split to create four total questions for clarity

We deemed many questions as salient to multiple roles and so categorized these questions with several roles (Figure 4.2.2-1). At the end, 7 questions were unique to the role of designer, pulled predominantly from HCI critical design research literature [37, 62, 72], and 5 unique questions for both funders [33, 158] and global health researchers [67, 133] from global health literature (Figure 4.2.2-1).

Figure 4.2.2-1. Total number of questions included in the library disaggregated by role, and noting the number of unique questions for designers, researchers, and funders.



Every question in the catalog was tagged with one of the five levels of reflection, ranging from the most basic level of "revisiting" (R_0) to the deepest level of "critical reflection" (R_4) [61]. We also debated whether to have the website deliver the prompts in a specific order that could guide a user from the most basic reflection to the deepest level of reflection. However, we opted instead to have the intervention randomly generate a prompt noting that participants may have only a limited time to interact with the intervention, particularly during future research workshops.

4.2-3 Conducting a heuristic evaluation

To identify potential usability issues early in the design process, we conducted a heuristic evaluation of the *(re)imaginator* Prototype v2. PT created a template using the ten benchmarks (called Heuristics) from Nielsen

Norman Group [122]. PT and RS then independently reviewed the *(re)imaginator* using this template. When the *(re)imaginator*'s design failed to meet a benchmark, they wrote design ideas for how to improve the feature. We reviewed their findings and recommendations as a group and incorporated many of their design recommendations into Prototype v3. The full heuristic evaluation and design recommendations are available in Appendix 1.

4.2-4 Piloting with global health students

The purpose of the pilot workshop was to test Prototype v2 during a mock-workshop. While the design recommendations from the Heuristic Evaluation were not yet incorporated, we conducted the pilot to test the workshop agenda, practice data collection and get feedback on the tool and workshop experience. We also added a System Usability Scale survey to better understand the *(re)imaginator's* usability and to allow us to to integrate these finds with the Heuristic Evaluation results to improve the intervention.

Participants

We recruited pilot participants through both RS and my network of global health classmates and colleagues. We recruited pilot test participants for an 85-minute Zoom Design workshop through the research team's network of global health classmates and colleagues.

Workshop agenda

Before the workshop

Pre-workshop Survey - ~15 minutes
We asked participants to complete a pre-workshop survey to gather demographic information, global health experience, and participants' current reflection practices. See the **Pre-Workshop Survey** in Appendix 2.

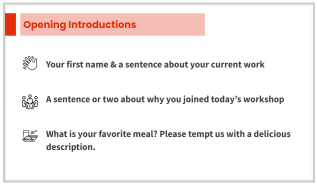
Design Workshop Schedule
Noting that the research workshops would be conducted with busy global health professionals, and given some early feedback from colleagues, we planned a 75-minute workshop agenda.

Activity 1 | Introductions - 5 minutes
Purpose: Ground the session as exploratory research, and introduce facilitators and participants to one another

Activity and Purpose

- PT and RS introduced themselves as facilitators
- I introduced myself and explained that I would be an off-camera observer for the session.
- Participants shared brief introduction and answered an ice-breaker question

Workshop Slide Screenshot



Activity 2 | Individual Discovery - Test a Reflection Tool - 20 minutes

Purpose: After simple instructions, individuals used the *Imagine* section of the *(re)imaginator* for 15 minutes and were asked to respond to as many reflection questions as possible

Activity and Purpose	Workshop Slide Screenshot	Data Collected
● Showed participants the *imagine* components of the intervention and guided them on how to use it ● Explained that the website cannot send reflections participants should record their answers ● Individual participants then used *(re)imaginator* for 15 minutes	 Copy of 20240117_(re)imaginato…	● Website metrics

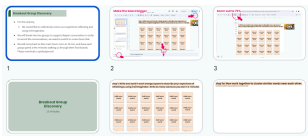
Activity 3 | Individual feedback = Mid-workshop Survey - 15 minutes

Purpose: Survey participants to gather general feedback on their experience, and reply to the three surveys: System Usability Scale, Learning Activities Survey, Technology Supported Inventory. See Mid-workshop Survey Design for a full description of the survey design

Activity and Purpose	Survey Tool	Data Collected
● Get feedback on participants' their individual experiences using *(re)imaginator*	Google form and see Appendix 2 for all questions included in the pilot survey.	● Description of how they used *(re)imaginator* ● System Usability Scale ● Learning Activities Survey ● Technology Supported Inventory

Activity 4 | Group Feedback on Tool - 10 minutes

Purpose: Exercise in two small groups to gather words to describe the activity, their experiences using the intervention and ideas for how to strengthen the tool

Activity and Purpose	Workshop Slide Screenshot	Data Collected
● Group activities to describe and critique *(re)imaginator* ● In a Google workbook participants responded to three questions: ○ *Step 1: Write a single word in each orange square to describe your experience. Try to write as many words as you can within 3 minutes.* ○ *Step 2: For each word, provide a brief description. Group your experiences near the words that best fit them.* ○ *Step 3: Examine the board and write down suggestions in the green squares to improve the (re)imaginator.*	 Copy of Practice Workshop - Bre…	● Share words to describe their experience using *(re)imaginator reflect* ● Description of experiences associated with selected words ● Ideas for how to improve the *(re)imaginator* design

Activity 5 | Group Discovery Activity Exercise - 15 minutes **Purpose** Open-ended writing prompt to ascertain design features from each participant	
Activity and Purpose Group Discovery Activity prompt asked participants to write a paragraph about how they would design a reflection tool that would be successful in their organization.	**Data Collected** Open-ended response to question
Closing - 15 minutes **Purpose**: We shared an overview of the additional sections of *(re)imaginator* to entice the participants. We elected to do this at the end of the session so we did not influence their design ideas and critique. This allowed them to generate their ideas, assuming they stuck to only activity 1 of using the *imagine* section and did not explore other parts of the website.	
Final Workshop Feedback **Purpose**: Finally, we invited and discussed feedback on the pilot session with participants and shared a link so they could opt in to receive study results.	

Workshop data collection

We designed the ~15-minute, mid-session survey to measure the pilot tester's experience using *(re)imaginator* and any initial linkages between the intervention and transformative learning. The survey contained 11 questions (7 short-answer and 4 multiple choice questions), along with three, validated questionnaires (Table 4.2.4-1). Note that all questions and adaptations are shared in Appendix 2 - Data Collection Tools.

Table 4.2.4-1. Summary of survey tools used.

Survey Tool	Rationale for Use
General Questions	General questions about their experience using the *(re)imaginator*. See Appendix 2 for a full list of these general questions.
System Usability Scale	System Usability Scale (SUS) 10-item questionnaire used to evaluate the usability of software, hardware, apps, and websites [30].
Learning Activities Survey (LAS) [125]	Measures "whether, and to what extent, a perspective transformation has occurred as a result of a transformative experience" [125].
Technology-Supported Reflection Inventory (TSRI)	Evaluates how effectively a technology supports reflection [19].
Website data	Click data for Step 3 collected to ascertain which questions were skipped, skipped because they were deemed confusing or irrelevant or questions responded to.

System Usability Scale

The System Usability Scale (SUS) is an industry-standard, 10-item questionnaire used to evaluate the usability of interventions including software, hardware, and websites [95, 96]. The SUS was invented by John Brooke in the mid-1980s as a tool to measure the perceived "appropriateness" of an intervention [27]. Rather than having the designers and engineers rate the usability of their artifacts, the SUS engages end-users to rate their overall experience using an intervention. It measures whether an intervention's design is intuitive, consistent, simple, and easy to use.

The ten questions in the SUS were slightly modified to better reflect the intervention and measured by a 5-point Likert scale from strongly disagree to strongly agree (Appendix 2 for the survey). The SUS was administered as part of the mid-workshop survey, directly after the participants used the *(re)imaginator*.

Technology-Supported Reflection Inventory

We also shared Bentvelzen et al. Technology-Supported *Reflection Inventory* (TSRI) [19] that I adapted to better reflect *(re)imaginator* goal of influencing work practices—rather than exploring data on a personal informatics device as it was originally designed (Chapter 3.2.4). Table 4.2.4-2 gives a sample of the original questions compared with my modifications for this study, and the full survey is available in Appendix 2.

Table 4.2.4-2. Original TSRI survey questions along with selected adaptations and rationale for these changes, see Appendix 2 for full details.

Original Dimensions & Questions [19]		**Adapted Questions for Practice Mid-Workshop Survey**	**Rationale for Modifications**
Insight	*Using this system has led to a wake-up call to make changes in my life*	*Using the (re)imaginator website has led to a wake-up call to make changes in my work*	The question was generally updated to better reflect the intervention and the intention to reflect on work practices.
Exploration	*I enjoy exploring responses with the system*	*I enjoy exploring question prompts with the (re)imaginator website*	The pilot workshop activity only asked participants to explore question prompts. It did not introduce participants to the Connect page of *(re)imaginator,* which gives participants the ability to explore responses.
	The system makes it easy to get an overview of my personal data	*The (re)imaginator website makes it easy to see various question prompts*	*(re)imaginator* lacked a feature to export a user's individual data; instead, participants received instructions to copy and paste their reflections. Questions were modified to reflect the scope of the pilot workshop activity and website design for participants to explore a variety of question prompts.
Comparison	*I reflect on my data in the system with others*	*I compare my responses with other responses*	Updated question to replace "data" with responses given data input into *(re)imaginator*. However, since the workshop activity will not introduce participants to the Connect page, we expect a negative response for this question.

Learning Activities Survey (LAS)

As described in Chapter 3, Dr. Kathleen King created the *Learning Activities Survey* (LAS) based on sociologist's Jack Mezirow's 10 stages of transformative learning [111, 125]. In this study, I adapted King's LAS to align with the goals of the *(re)imaginator* intervention to transform work practices. I also incorporated modifications from Ortiz-Lampier and Harrell HCI research [125]. Appendix 2 has the complete survey used in this study, along with a

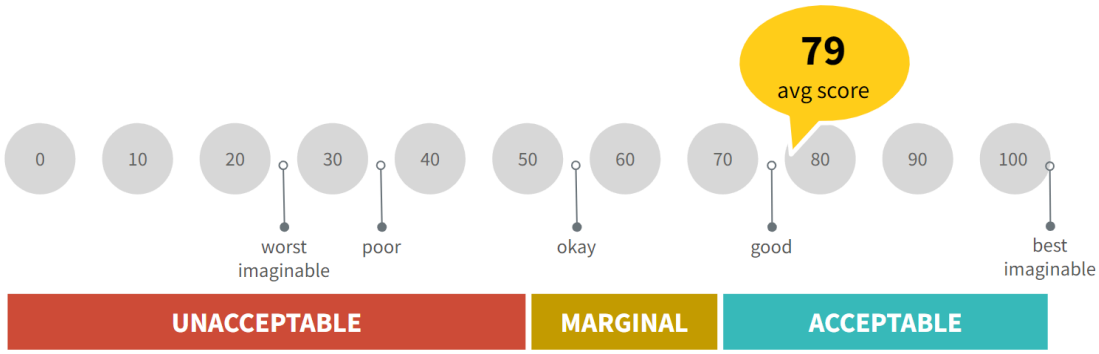
comparison between the questions from King's original LAS and the HCI-adapted version from Ortiz-Lampier and Harrell.

4.3 Refining the intervention and study design

4.3-1 Pilot testing

Overall 12 people expressed interest in participating in the workshop, and seven people joined the 1.5 hour pilot workshop session in January 2024. All participants had global health professional experience with most at a senior or executive level. Their demographics reflected our intended audience for the research workshops and supported a more realistic pilot test. All 7 participants completed the workshop and key surveys, including the System Usability Score (SUS). The SUS evaluates the usability of a tool; while participant scores ranged from 42.5 to 100, the average SUS score of 79 (median 82) put the intervention's design in the "acceptable" usability range (Figure 4.3-1). Thus, we felt comfortable using this website in our research study.

Figure 4.3-1. Average (re)imaginator SUS score shown on the overall SUS scale.



4.3-2 Design changes

Based on the heuristic evaluation and pilot test, we made several changes to the *(re)imaginator*'s design and the workshop activities. Appendix 3 includes a high-level summary of these design changes along with links to all the decks we created to communicate desired design decisions to the web designer.

One major change was separating the reflection workflow into four different pages. On each page, we added a written cue by including the step number of the page and the total number of steps (e.g., step 2 of 4) as a progress bar (Figure 4.3-1). We also made many significant design changes to enhance usability and accessibility, including changing button colors to enhance contrast, ensuring consistent font types across all pages, and simplifying text.

We also added better introductions to each page to describe their purpose. For example, we updated the text on the second reflection step from "Choose a role on the project you'd like to explore" to "Choose one of your roles on the project," because participants shared that global health practitioners often have multiple project roles (Figure 4.3-1). This text change acknowledges that while a person may have many project roles, they must specify one role to use this intervention.

Figure 4.3-1. Prototype v3 shows the "Step 1 of 4" written cue to guide users through the four steps of reflection.

4.3-3 Updating data collection tools

We also updated the Pre-workshop Survey to ensure we collected age categories, gender, and adapted the multiple choice question for global health experience to be specific to both academic and professional levels. We shortened the mid-workshop survey to include only the TSRI and LAS, and only a couple of open-ended questions to describe their experience. The goal of this was to shorten the workshop duration and reduce participant fatigue, particularly after they had spent 15 minutes reflecting. We also re-wrote many of the LAS and TSRI prompts for clarity and conciseness (see Appendix 2 for annotated changes to the data collection tools). Finally, we also expanded the LAS to include *all* questions, based on a conversation with the creator of the LAS. She encouraged me to think about the LAS as a mixed-method tool rather than a quantitative measure, and stressed that participants' responses should be interpreted. Thus, I added the full set of questions to give additional data points that would help us contextualize participants' perspective transformation.

4.3-4 Adding click metrics

In Prototype 3, we also incorporated more click metrics within the page design. One added metric measured the decision to "skip," "skip confusing," or "I'm ready to write my reflection.below each prompt. This data could be used to help us refine the question library by identifying frequently skipped or confusing prompts. It would also allow us to analyze potential trends across selected user roles and their question preferences.

4.3-5 Workshop adjustments

Table 4.3-1. Summary of proposed adaptations to the pre-workshop survey and workshop session.

Activity	**Allotted** vs. ***Actual time***	**What we thought?**	**Future workshop adjustments**
Introductions	5 minutes ***12 minutes***	Took longer than expected	Removed the "why are you attending workshop" to the pre-workshop survey. This felt like a waste of time and like pandering to the study team when said aloud.
Individual Discovery - Test a Reflection Tool	20 minutes ***21 minutes***	Silence felt awkward	No change, as we determined that playing music may interrupt focus, and we should allow participants to create their own reflection environment (as indicated by Fleck and Fitzpatrick). Added additional instructions to guide participants to create their ideal environment but remain muted.
Individual Feedback	10 minutes ***15 minutes***	Took longer than expected, and some participants mentioned that it felt redundant	The pilot feedback contained additional questions to have participants provide feedback on the pilot and conduct the SUS survey. We reviewed and shortened the survey questions for clarity.
Group Feedback on Tool	25 minutes ***34 minutes***	Facilitators were new at running this kind of activity and needed more guidance to stoke discussion	Created a facilitator's manual and did additional training to promote "think aloud" methods during this activity. Furthermore, we removed the feature of having participants write in virtual sticky notes as this hindered conversation and connection between participants.
Group Discovery Activity	15 minutes ***Activity skipped***	Ran out of time to complete, and three activities in a 75-minute workshop seems overwhelming	We combined this activity into the breakout activity rather than the sticky note exercise to support more conversation between participants.
Closing	5 minutes ***3 minutes***	Ran short on time and wanted to prioritize feedback	We simplified the slides

4.4 Chapter summary

Chapter 4 details the iterative design and development of the *(re)imaginator* tool, a digital intervention aimed at fostering critical reflection among global health practitioners. Building this intervention around restructuring current global health power dynamics, as informed by my adapted version of Patricia Hill Collins' *Matrix of Domination* framework Chapter 2.5, helped me identify key stakeholders and tailor the prompt library to these roles. This intentional alignment gives the tool structural alignment with the theory of change, where each layer of the *Matrix* is represented through key roles.

Key design changes also emerged from our process of engaging stakeholders along with results from the System Usability Study and our Heuristic Evaluation. Based on this formative research and guidance from our professional designer Natalie, we redesigned the website into a stepped flow by breaking the *reflection* interaction into steps. This approach was intended to streamline the user experience and reduce cognitive load, so practitioners could focus their attention on reflection. Additionally, this modification introduced deliberate pauses that could also provide users with time to absorb and process information. This also eliminated a need for a pop-up window to capture user-reflections, which enhances site accessibility [136]. Thus, the stepped interaction may make the tool simpler to use, direct attention towards reflection rather than using the site, and

enhance accessibility. We also redesigned workshop and data collection tools to better align with research questions and minimize unnecessary data collection to reduce study burdens on future participants.

Similarly, we added a feature for private posting to address potential privacy concerns and to also be able to detect user preferences (e.g., whether they prefer to post publicly or privately) for reflection. We also conducted a thorough prompt review, using modified Delphi Consensus methods, to revise questions. This approach was particularly useful as two of the reviewers (NS and RS) had more limited exposure to HCI readings and could identify confusing jargon, demonstrating the value of systematic peer review in tool development.

To provide users with greater control over their reflections, we introduced a private post option. This feature was added based on our research team's discussions about privacy, particularly given that the research workshops participants would be using the tool *alongside* their colleagues. This synchronous use could risk the potential for posts to be identified. It also gave users more control that may enhance their comfort using the tool. This change would also allow us to gather data on user preferences for public or private sharing.

This iterative design and development processes helped us build, conduct preliminary evaluations and adjust the intervention design. This process also helped us better align our data collection processes to ensure we would collect information to answer our research questions. This review led to creating additional click metrics and features within the *(re)imaginator*'s design. The pilot testing also led to significant changes in both the workshop activities and surveys based on participant feedback. This stage prepared us to launch the final research study with confidence.

5 | Testing *(re)imaginator* with global health practitioners

5.1 Introduction

Having established the context of power imbalances within global health and decolonization efforts (Chapter 1), and shared my personal journey towards critical reflection (Chapter 1), this chapter presents the core study. Building on the theoretical frameworks of Feminist Theory and Critical Technology Studies (Chapter 2) and drawing on HCI research on reflection interventions (Chapter 3), we designed, developed, and piloted the *(re)imaginator* intervention (Chapter 4). This chapter details the primary investigation into the intervention's impact on global health practitioners. To our knowledge, this is the first intervention designed to support individual critical reflection in this field.

This chapter answers the two major aims of this dissertation: (RQ2) how global health practitioners engage with and perceive *(re)imaginator*, and (RQ3) the extent to which engaging with *(re)imaginator* provokes individual practitioners to rethink and reimagine their interventions. The main research questions were divided into five sub-questions (Table 5.1-1)

Table 5.1-1. Main and sub-research questions answered in this section.

Research Question	Sub-questions
RQ2. How do global health practitioners engage with and perceive *(re)imaginator* for critical reflection?	RQ 2.1 How do global health practitioners describe their baseline personal and organizational reflection practices?
	RQ 2.2 How do participants engage with and perceive *(re)imaginator* for reflection?
RQ3. To what extent does engaging with *(re)imaginator* provoke individual global health practitioners to rethink and reimagine their interventions?	RQ 3.1 What level of perspective transformation do global health practitioners experience directly after using *(re)imaginator*?
	RQ 3.2 How does perspective transformation change over time?
	RQ 3.3 How do participants describe their reflection practices after the workshop?
	RQ 3.4 What design features may help global health practitioners critically reflect and embed reflection into practice?

5.2 Methods

The study protocol was reviewed by the University of Washington Human Subjects Division and designated exempt from full review, meaning that the study presented “no more than minimal risks to participants” (IRB STUDY00017559). Our research team for this study was composed of two research assistants, Purva Tekkar (PT), Raquel Sanchez (RS), Dr. Beth Kolko, and me.

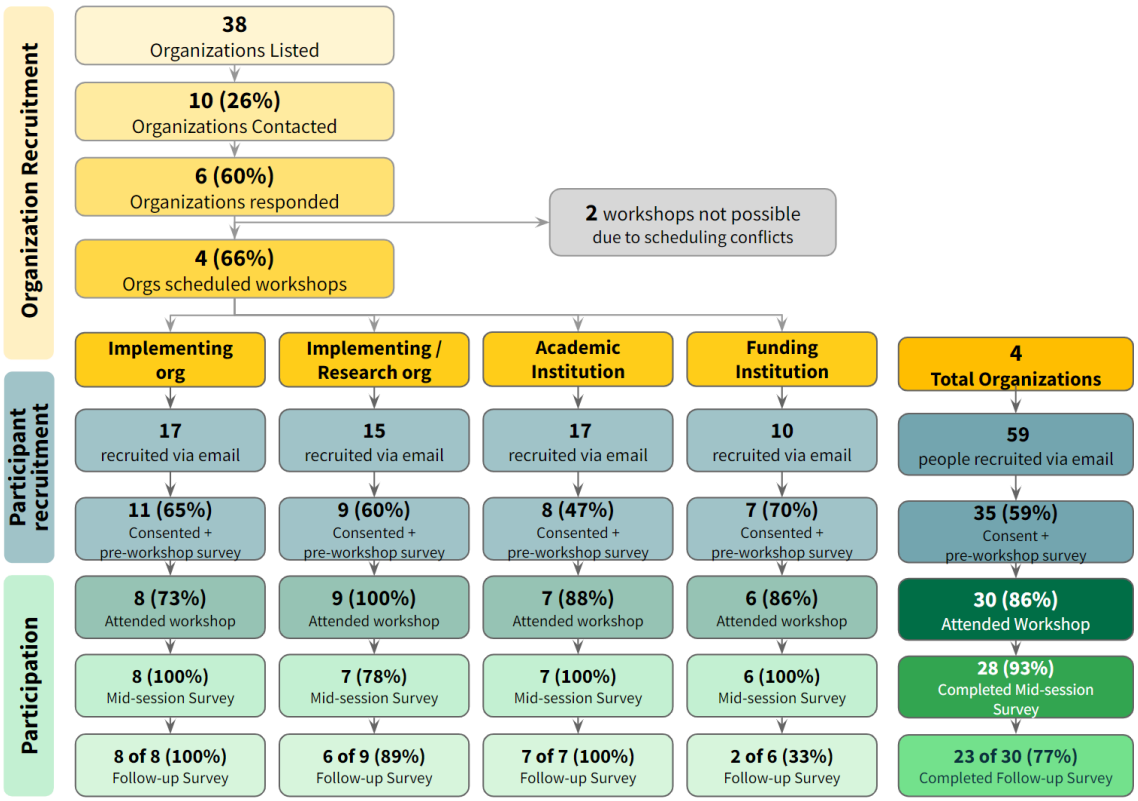
5.2-1 Sampling and recruitment

I drafted a list of global health organizations based on my 12-years of experience working in the global health sector and with additional input from RS. Drs. Beth Kolko and Nancy Puttkammer reviewed this list and suggested additional organizations based on their experience. To organize the list of global health organizations, I categorized each entity based on their portfolio type and primary focus area. The categories were *implementing*, *research*, *academic*, *funding*, or *leadership* organization, aligning with the Matrix of Domination framework [39] (Chapter 2.4). When recruiting, I prioritized contacting organizations within each of these categories to engage a diverse participant pool.

Through a purposeful sample, I sought to engage practitioners representing different organization types to better understand how the *(re)imaginator* tool may support reflection and learning across various organizations. By involving organizations that could critique the various roles and aligned question prompts, I aimed to capture perspectives on reflection and *(re)imaginator* from different stakeholders. Of the 38 organizations in the preliminary list, I emailed 12 organizations—five implementing organizations, three academic institutions, two funding organizations, and two North American government agencies. These emails described the study's goal and included a one-page information sheet. I sent two to three reminder emails to organization contacts who did not respond to the initial email. If a representative from the organization expressed interest, I shared the consent form and pre-screening survey, and requested that the organizational contact circulate these materials to their colleagues. I emphasized that participation was voluntary and participants should opt in to this study.

Since the *(re)imaginator* tool was designed to be used by individuals within organizations, rather than in a group or team setting, I also encouraged organizational contacts to share the recruitment materials across leaders within their organization who met the eligibility criteria (see below). Six organizations responded to the initial contact email and I hosted phone calls with two interested organizations to explain the study design. Of these six, two implementing organizations declined participation given difficulty accommodating the workshop in their schedules, leading to a final sample of four organizations (Figure 5.2-1).

Figure 5.2-1. Recruitment, participation, and survey response rates.



Participant eligibility criteriaParticipants were aged 18 years and older and who currently worked at a global health organization. Additionally, people in leadership roles were targeted for recruitment (e.g., executive directors, managers, program leads) with the expressed desire to interact with leadership who have decision-making power and, likely, broader knowledge of how to influence systemic change within their organizations. This study excluded participants who currently worked with me, were under 18 years of age, and/or not currently working at a global health organization.

Organizational characteristics

Four different organizations agreed to participate in this study (Table 5.2-1). All had organizational headquarters or offices in North America. The first organization is a multinational implementing organization, where participants work in five different country offices. The second organization is also an implementing organization that works in one country and has paired implementation with routine evaluations and research. Participants in this session were specifically recruited from their organizational research team as the Executive Director identified this group as the most comfortable English-speakers within their organization. The academic institution participants all worked in the Global Health Department as researchers and faculty. Finally, the funding organization is a private, philanthropic organization that funds health interventions.

Table 5.2-1. Summary of participating organizations.

Organization Type (abbreviation)	Description	Why selected
1_Implementing Organization	Country-representatives from a multinational implementing organization. Each of the five country offices represented stands as an independent NGO under the umbrella and support of the "head" office based in North America	Directly implement programs in variety of countries and communities
2_Research Team of Implementing Org	Research team members from an implementing organization working in one country in East Africa	Representatives of their research team, who have evaluated programming since NGOs inception
3_Academic	Faculty from the Global Health Department	Academic researchers and faculty training the next generation of global health scholars
4_Funding	Team at a philanthropic organization headquartered in North America that works on data systems	Represents a donor organization

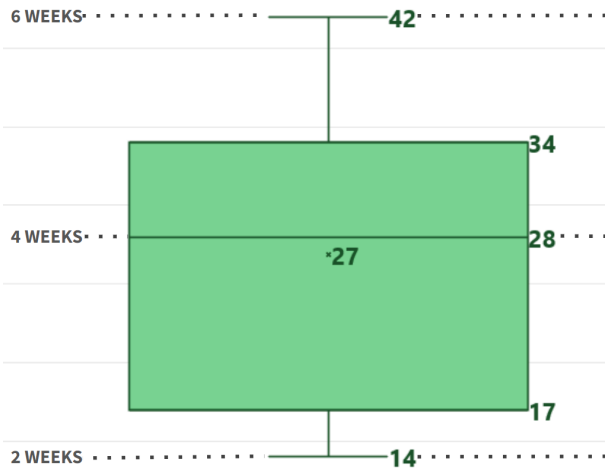
Participant sample size and response rates

In total 59 people were emailed for recruitment. Of the 59 potential participants, 35 (59%) consented to participate. Of these 35 consented participants, 30 participants participated in the workshop (Figure 5.2-2). The small sample size limits the generalizability of findings and statistical power. However, the sample is sufficient to explore preliminary trends related to the research questions.

While all participants completed the baseline survey, participant retention decreased for mid-workshop and follow-up surveys. Twenty-eight (93%) participants completed the mid-session survey. The two participants who did not complete the mid-workshop survey joined the session mid-way and were thus lightly exposed to *(re)imaginator* intervention but participated in the group activities. Only 23 of the 30 (77%) participants completed the follow-up survey. Of the seven who did not complete the survey, four were from the funding organization, representing a 66% non-response rate and limiting trend analysis for this group (Figure 5.2-1).

While the follow-up survey was sent and intended to be completed at two weeks post-workshop, participants had a median response time of four weeks, with a range between two and six weeks after the workshop (Figure 5.2-2). This discrepancy between the intended and actual follow-up periods complicates direct comparisons of reflection frequencies between baseline and follow-up assessments.

Figure 5.2-2 Box plot of the follow-up response time measured in days since the workshops.



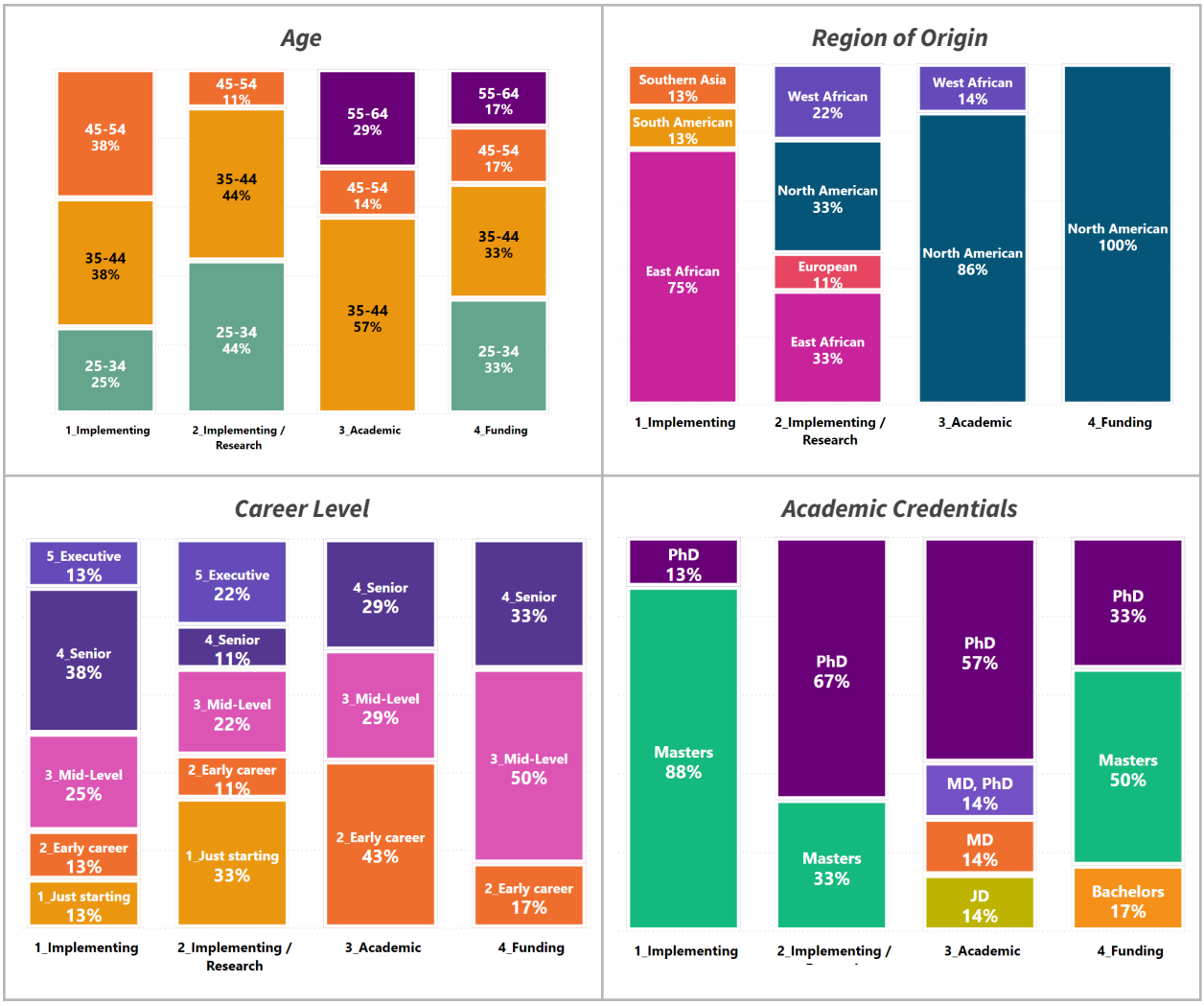
Participant characteristics

Most participants were middle-aged, identified as female (53%), and half originated from North America, with most North Americans working at the academic or funding organization (Figure 5.3-2). Eight-three percent of participants had mid- or senior-level global health experience and 97% had graduate level degrees. Four participants noted that they were in their early career or internship phase, and all four of these more junior participants worked at implementing organizations. Notably absent were government officials and community members, limiting the study's representativeness.

The characteristics of this participant pool may have influenced their experiences with the *(re)imaginator*. As all participants were affiliated with North-American-based organizations, they likely had greater exposure to diversity, equity, and inclusion initiatives in the last few years (as measured in the most recent *Global Health 50/50* report [172]). This familiarity may have impacted their comfort level when engaging with the tool's reflective prompts and opened them to be more critical of their role and the field. Additionally, the field's spotlight on decolonizing may have also influenced who self-selected to be in this study, given increased appetite from some practitioners of learning about tools aimed at promoting meaningful change.

Additionally, many academic journals and funding organizations have recently updated their submission processes to require equity and inclusion statements [93, 138, 145, 148]. Since most of the participants in this study are in leadership positions (per the recruitment criteria and as demonstrated in their self-reported career levels) and interact with funding and publishing organizations, many have likely already had to articulate *how* their work promotes equity. These demographic and inclusion traits may make the intervention easier to understand and use for this specific participant pool.

Figure 5.2-2. Participant characteristics by organization, disaggregated by age, region of origin, career-level and academic credentials



5.2-2 Data collection

We collected data using three methods: workshop audio-video recordings, online surveys, and *(re)imaginator* website metrics. Table 5.2-2 summarizes how the data aligns with the research questions, study activities, and data collection method).

Table 5.2-2. Summary of activities, data sources, relationship to sub-research questions and data collection method..

Activity ***Data collection Mechanism***	**RQ 2.1** **Characterizing reflection practices** before workshop	**RQ 2.2** **Engaging with *(re)imaginator***	**RQ 3.1 & RQ 3.2** **Perspective Transformation Changes**	**RQ 3.2** **Characterizing reflection practices** after workshop	**RQ 3.3** **Design features for reflection**
Pre-workshop ***survey***	🔢 *Survey Questions* 💡 *Free Text Questions*				
Mid-session ***survey***		🔢 *TSRI (reflection index)* 🔢 *Survey Questions* 💡 *Free Text Questions*	♻️ *Learning Activities Survey*		
Workshop Group Activities ***audiovisual recording***	💡 *Group Activity 1 & 2 may describe current practices*	💡 *Group Activity 1: Feedback on (re)imaginator*			💡 *Group Activity 2: Embedding reflection into practice*
Follow-up ***survey***		🔢 *Survey Questions* 💡 *Free Text Questions*	♻️ *Learning Activities Survey*	🔢 *Survey Questions* 💡 *Free Text Questions*	🔢 *Survey Questions* 💡 *Free Text Questions*
(re)imaginator ***website data***		🔢 *Response categories and click data*			
Icons: lightbulb (💡) = qualitative data, number icon (🔢) = quantitative data, and the arrows (♻️) denotes mixed methods					

Intervention workshops

This study relied on a single-session and brief exposure to the reflection tool. We held four, seventy-five minute workshops via Zoom with each organization separately. We scheduled the workshops with each organization, using existing meeting slots where possible to reduce coordinating participants' busy schedules. Due to scheduling constraints, we limited the workshops to 75 minutes, a duration set by our team as both feasible to achieve our goals and to minimize participant burden.

After a 10-minute presentation on all the *(re)imaginator*'s features, participants were invited to individually use the *(re)imaginator* for 15 minutes (Table 5.2-3). While this short exposure to the intervention likely limited participants' exploration of key features of the overall website, we asked participants to prioritize individual reflection using the *imagine* pages of the site. However, this short exposure likely impacted our findings. For example, the "comparison dimension" score from the TSRI survey was likely impacted because participants were not asked to review key pages that support this dimension (e.g., *connect* and *learn* pages). This limited exposure to the *connect* page, for example, may have also impacted participants' comfort level with posting reflections publicly. Without seeing how posts were displayed publicly, workshop participants may have defaulted to posting privately. Additionally, a single-session intervention also limits our findings, where repeated use of the tool over several workshops or time points would have generated richer feedback on features and repeated use of the tool.

We conducted all four workshops within the designated 75-minute timeframe using the activities in Table 5.2-3. However, one session (with the funding organization) started 15 minutes late due to technical difficulties, so these participants did not complete the Group Activity 2 (Table 5.2-4). To compensate for this, we adjusted Activity 1 to incorporate key questions from Activity 2. This approach ensured that valuable information regarding both the participants' experiences with the *(re)imaginator* and participant ideas for integrating reflection into their organizational practices was still collected, albeit quickly.

Table 5.2-3 (re)imaginator workshop activities (Appendix 2 for workshop deck)

Activity	Time	Description of Activity
Introduction	**10 minutes**	Overview to define *Critical Reflection* and introduce participants to research goals.
Individual - Test a reflection tool (use *(re)imaginator*)	**15 minutes**	After a brief overview of the website features and click-by-click instructions for how to conduct reflection using the tools, participants had 15 minutes "to respond to as many reflection questions as you would like." A countdown timer was used on the slides to track time to ensure consistency across workshops.
Mid-Session Survey - individual feedback	**10 minutes**	We shared a survey link and asked participants to spend 10 minutes with a countdown timer on the screen. At 9 minutes, we reviewed the number of completed surveys and gave additional few minutes as needed. Participants were invited to take a break if participants finished early.
Group Activity 1: Feedback on *(re)imaginator*	**15 minutes**	In small groups of 6 people or fewer (larger workshops were split into two small groups), where we asked participants a series of questions to summarize and share their experience using *(re)imaginator.* We captured responses on a shared slide for a visual record of conversation.
Group Activity 2: Embedding reflection into practice **(speculative design activity)**	**15 minutes**	In the large group, we asked participants to "shake off and forget" the *(re)imaginator* and, through some visuals, were "teleported" into a future where their specific organization was using reflection tools that were "going well." The idea of "going well" was not defined. We invited participants to describe how their organization was conducting reflection processes to reach this idealized future and how they knew it was going well.
Closing	**1 minute**	One slide was shown thanking participants, outlining the follow-up process and sharing a QR code for participants to select whether they wanted to opt in to receive study results.
Thank you email	**Sent after the workshop**	After the workshop, we emailed all participants 24 hours to thank them for their participation, gave a link to *(re)imaginator* and invited them to both use and share *(re)imaginator*. We also shared a link to sign up and receive study results.

The two research assistants, Purva Tekkar (PT) and Raquel Sanchez (RS) facilitated workshops 1 and 4, (Chapter 4), who also helped co-design the workshop activities, facilitator guide, and accompanying slide deck (Appendix 2). Workshops 2 and 3 were facilitated by me and PT, as RS was ill during both sessions (Table 5.2-4). The facilitator's guide outlined the research goals and ideas for probing questions that aligned with the research goals. We all practiced delivering the workshop during the pilot study (Chapter 4) and several times after we revised their workshop content based on the pilot study results. We hosted all workshops on Zoom and audio-recorded each session.

Table 5.2-4 Workshop overview by organizational type

Workshop Number	Organization	Group Activity 1 Completed	Group Activity 2 Completed	Facilitated by
Workshop 1	1_Implementing Organization	✅Yes	✅Yes	PT and RS
Workshop 2	2_Research Team of Implementing Org	✅Yes	✅Yes	PT and ELD
Workshop 3	3_Academic Organization	✅Yes	✅Yes	PT and ELD
Workshop 4	4_Funding Organization	✅Yes	❌No	PT and RS

Surveys

The study utilized electronic surveys at three time points: pre-workshop, mid-workshop, and post-workshop (two weeks after the workshop). The surveys included two validated tools (*Learning Activities Survey* and *Technology Supported Reflection Index*) along with several single-choice and free-text, open-ended questions.

♻️*Learning Activities Survey*

The mid-workshop and follow-up surveys incorporated a modified version of the mixed-methods *Learning Activities Survey* (LAS) [88, 124, 125] (Chapter 3.2.5). I modified the HCI-adapted LAS questions from Ortiz-Lampier and Harrell [125] to align with the *(re)imaginator* intervention's features and workshop scope. King emphasized the interpretative nature of the LAS survey results and recommended dovetailing the quantitative measures with qualitative questions to guide interpretation. The complete survey instrument is included in Appendix 2. The mid-workshop survey measured immediate changes in participant perceptions following *(re)imaginator* use, while the follow-up LAS measured any longer-term perspective transformations.

🔢*Technology Supported Reflection Index*

This study also utilized the *Technology-Supported Reflection Inventory* (TSRI) directly after participants used the *(re)imaginator* tool to measure how well this intervention helped them reflect (Chapter 3) [19]. For this study, I tailored the TSRI questions to both the *(re)imaginator* website and workshop activities. Most changes modified the TSRI to measure whether the tool helped participants reflect on their work activities and interactions (rather than a personal informatics device, per its original design) (Appendix 2 - TSRI for a full list of questions and adaptations). Additionally, while the original TSRI rates the three dimensions using nine questions, I split the ninth question into two questions, so respondents would specify whether they shared their experience with (1) leadership or (2) colleagues.

5.2-3 Qualitative data

I analyzed all workshops and free-text survey data in the Dovetail software. This qualitative coding program supports both coding and thematic analysis. It also has a feature that auto-generates transcripts from Zoom recordings. I re-listened to all the workshops and corrected the Dovetail transcriptions to match the recordings. I also anonymized the written transcripts by removing participant names and any identifying information (such as organization names or country locations). I also used Google Translate to translate French-to-English for two participant surveys, and then had a fluent French speaker review and revise these translations for accuracy.

PT, RS and I analyzed audiovisual recordings and free-text survey questions using the Codebook Thematic Analysis technique [25] (also known as 'Template Analysis' [89]). This "middle-ground approach" to Braun and Clarke's Thematic Analysis (TA) methodology was developed by psychologist Nigel King and colleagues [25, 26, 89]. As Braun and Clarke describe, this method is "particularly suited for experiential approaches" and is "useful for exploring perspectives of different groups" [25].

Codebook Thematic Analysis is guided by a Critical Realist approach. This approach recognizes that a person's understanding of reality is shaped by ontology (i.e., their subjective perspectives and experiences) and epistemology (i.e., defined by their situational knowledge) [25]. This method reflects the underlying theories driving this dissertation (Chapter 2). This qualitative analysis method acknowledges the interplay between social and political structures that influence an individual's experiences and perspectives.

Codebook Thematic Analysis also retains a 'postpositivist sensibility' [13], offering both a high degree of (a) structure by using a codebook, and (b) flexibility by starting with an open coding approach using Braun and Clark's Reflexive TA methodology [13]. I opted for Codebook Thematic Analysis as given its suitability to uncover the richness and complexity of participants' experiences with both the *(re)imaginator* and critical reflection.

This qualitative method also requires us to acknowledge our implicit and explicit preconceptions about the research topic and intervention [13]. For example, our professional experiences in global health informed our interest in the topic and belief in its importance (Discussion section). In creating the codebook's themes and codes, we made decisions about what to include and exclude [25, 89] based on the research questions and our professional and research experiences. Based on Reflexive TA methods [25] and to provoke deeper consideration of our biases, we also each wrote private Reflexive Memos before and during data analysis. These Reflexive Memos were private to encourage more honest reflection and limit influences from each other. We also maintained an audit trail of key decisions made during discussions about qualitative coding, as recommended by Braun and Clark [13]. We used both the Reflexive Memos and Audit Trail to guide the Analysis and Limitations sections.

Step 1: Data Familiarization

We coded all transcripts using Dovetail software. To facilitate the open-coding approach, I created a copy of each workshop and survey for each researcher. We independently read all transcripts three times. During the third reading we highlighted "anything of interest accompanied by a brief explanatory comment" per King and Brooks [89]. The Dovetail software facilitated synchronization of transcripts with video, allowing for us to re-listen to any sections to hear participants' tone and context. Each researcher produced private summaries per Braun and Clarke methods as part of the open-ended review [25]. Additionally, we maintained an Audit Trail to capture key changes, and added to our individual Reflexive Memos during the analysis process, fostering both self-reflection and to note key limitations of our approach [25].

Step 2: Developing the Codebook

We met and reviewed our individual reviews from Step 1. We each wrote our ideas for themes and codes on a Google slide using stickies. Through affinity mapping, we combined our ideas and created themes by clustering keywords and ideas we independently recorded during Step 1. During this process, we documented key changes and rationales in the Audit Trail. We also organized the identified codes and themes into an initial draft Codebook [89]. We associated codes associated with themes, or the highest level of the hierarchy, noting that

not all codes were associated with a specific theme and remained independent codes in this step. We considered the Initial Codebook as a draft.

Continuing the Codebook Thematic Analysis approach [25, 89], we added *a priori* themes and codes based on the research questions, survey questions, and relevant frameworks from the scoping literature review. For example, we added additional codes related to depth of reflection based on Fleck and Fitzpatrick's Levels of Reflection [61] and the categories for assessing Technology-Supported Reflection per Bentvelzen et al. [19]. Per King and Brooks, we intentionally limited *a priori* themes to ensure they related to the study questions [89]. Finally, we turned the initial codebook into a Template in Google sheets, where we organized the themes and codes into a coding frame (also known as the Initial Template or Codebook) [89]. We added the Template to Dovetail to support step 3. The Dovetail software also allows quick review of individual codes to see all sections tagged with the codes to support coding harmony. During step 2 each researcher also added to the Audit Trail and continued writing our Reflexive Memos.

Step 3: Preliminary coding
We then coded all transcripts (workshops and free-text surveys) in Dovetail using the Template. We also continued inductive coding to encourage capturing additional, unexpected, phenomena, or experiences not covered by the Codebook; however, we did not add new codes during this step.

We were sensitive to coding both descriptive (semantic meaning the idea is shared in explicit language) and interpretive data (latent meaning the researcher's interpretation of the data) [25]. We also tagged illustrative quotes with relevant code(s). We then continued building out the Codebook to ensure that each theme was "internally coherent, consistent and distinctive" with a well-defined concept [25]. We also continued to add to both the Audit Trail and our Reflexive Memos during step three.

Step 4: Clustering and review
Next we reviewed the coded transcripts, with emphasis on reviewing sections that we tagged with 2+ codes [89]. Importantly, both Braun and Clarke [25] and King and Brooks [89] note that inter-rater reliability is *not* a useful measure for Thematic Analysis, so this was not analyzed. We examined the themes across the coded transcripts and identified top-level and sub-themes [89]. Themes were required to have many observations to be included as a top-level theme. We also looked across themes to see if there were any integrative themes meaning "undercurrents running through participants' accounts… [that] may not even be explicitly raised or addressed by participants" [89]. We continued to add to the Audit Trail and our individual Reflexive Memos.

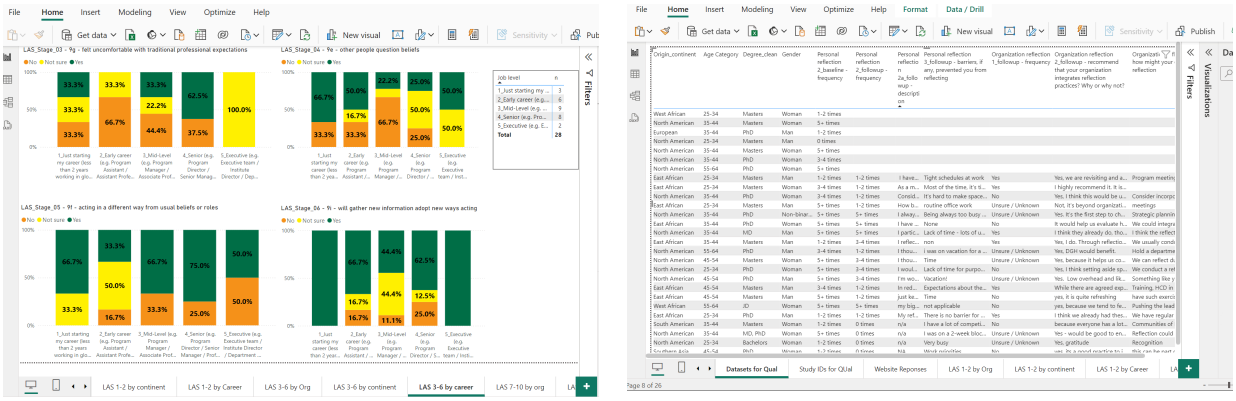
Finally, we reviewed the patterns and finalized the top-level themes. These included, per King and Brooks, themes that were most related to the research questions and key themes that contradicted research hypotheses [89]. We also included some themes that were meaningfully distinct between our participant groups [89]. Again, we also continued to add to the Audit Trail and our individual Reflexive Memos.

5.2-4 Quantitative data

I analyzed de-identified multiple choice and quantitative data using Google Sheets, Microsoft Excel, and Microsoft PowerBI. I selected Google sheets for light data cleaning, generating bar charts, and as the database for the PowerBI dashboards. I used Microsoft Excel to produce all box plot diagrams. I annotated some diagrams in

Google Slides for clarity. I then used Microsoft PowerBI software as it enabled linkage across pre-, mid- and follow-up surveys using participants' unique study IDs to support data visualization and disaggregation. PowerBI also supported exploring trends across survey data by allowing for easy disaggregation of data (e.g., by participant demographics or organization type) (Figure 5.2-2).

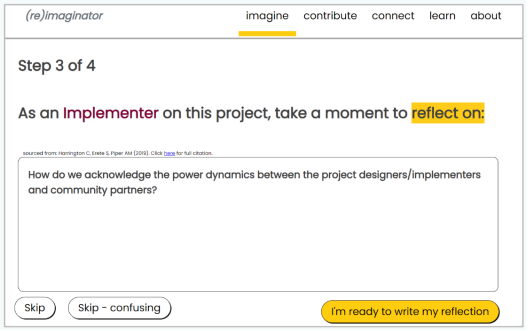
Figure 5.2-2. PowerBI data visualization showing disaggregation and datasets export.

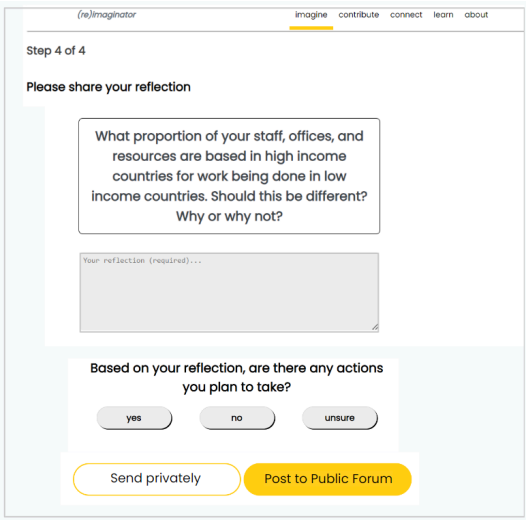
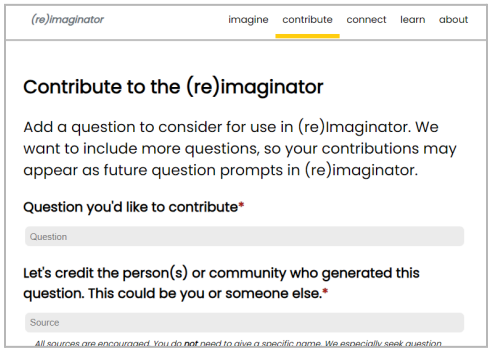


5.2-5 Website metrics

We also designed the *(re)imaginator* website to capture click metrics so we could better understand the system's use (Table 5.2-3). These data elements also recorded the date and time to ensure click-data could be attributed to each workshop.

Table 5.2-3 Website metrics and rationale for capture, along with screenshot from the (re)imaginator website.

***(re)imaginator* section**	**Metrics**	**Rationale**
Step 3 of the Imagine section 	Every participant selection for the reflection question displayed in Step 3, in the following categories which were defined in the workshop slides. **Skip**: This category was selected when a participant chose to proceed to the next question without providing a specific reason for skipping the current one. **Skip - Confusing**: This category was selected if a participant found a question to be unclear or irrelevant to their work, leading them to skip it. **I'm ready to write my reflection**: This response was selected to write a reflection	These categories may offer insights into participant engagement with the various reflection questions. In cases where certain questions were frequently skipped, these metrics prompt researchers to reconsider or remove the question from the website.
Step 4 of the Imagine section	Reflection responses submitted by participants captured: • Role they selected • Question they answered	These metrics may support capturing the most popular questions responded to per role and comfort level

(re)imaginator section	Metrics	Rationale
	• Whether they decided to post their reflection publicly or privately	sharing publicly.
Contribute section 	This page captured new reflection questions submitted to the website, and allowed us to post these new questions.	This page supports community contributions and allows us to screen and post questions to the library.

5.3 Results

The results are organized into four sections that align with the sub-research questions (Table 5.3). We begin by describing participants' perceptions, practices, and experience with reflection, both before and after using the *(re)imaginator*. We describe the extent this intervention provoked transformational learning and end with recommendations for how to better embed reflection into practice and provide design suggestions. Note that results from Research Question 3.3 are included under Research Question 2 to guide comparing baseline to follow-up descriptions of reflection. See Appendix 4 for granular and disaggregated results.

Table 5.3 Research questions and connection to results section.

RQ2. How do global health practitioners engage with and perceive (re)imaginator for critical reflection?	
Sub-questions	**Results Section**
RQ 2.2 How do participants engage with and perceive *(re)imaginator* for reflection?	5.3-1. Engagement with and perceptions of using the *(re)imaginator*
RQ 2.1 How do global health practitioners describe their *baseline* personal and organizational reflection practices? RQ 3.3 How do participants describe their reflection practices *after* the workshop?	5.3-2. Descriptions of personal and organizational reflection practices before (RQ2.1) and after the workshop (RQ 3.3)

RQ3. To what extent does engaging with (re)imaginator provoke individual global health practitioners to rethink and reimagine their interventions?	
Sub-questions	**Results Section**
RQ 3.1 What level of perspective transformation do global health practitioners experience directly after using *(re)imaginator*? RQ 3.2 How does perspective transformation change over time?	5.3-3. *(re)imaginator* and perspective transformation (RQ3.1 and RQ 3.2)
RQ 3.4 What design features may help global health practitioners critically reflect and embed reflection into practice?	5.3-4. Design strategies for embedding reflection into global health practices

5.3-1. Engaging with and user perceptions of the *(re)imaginator*

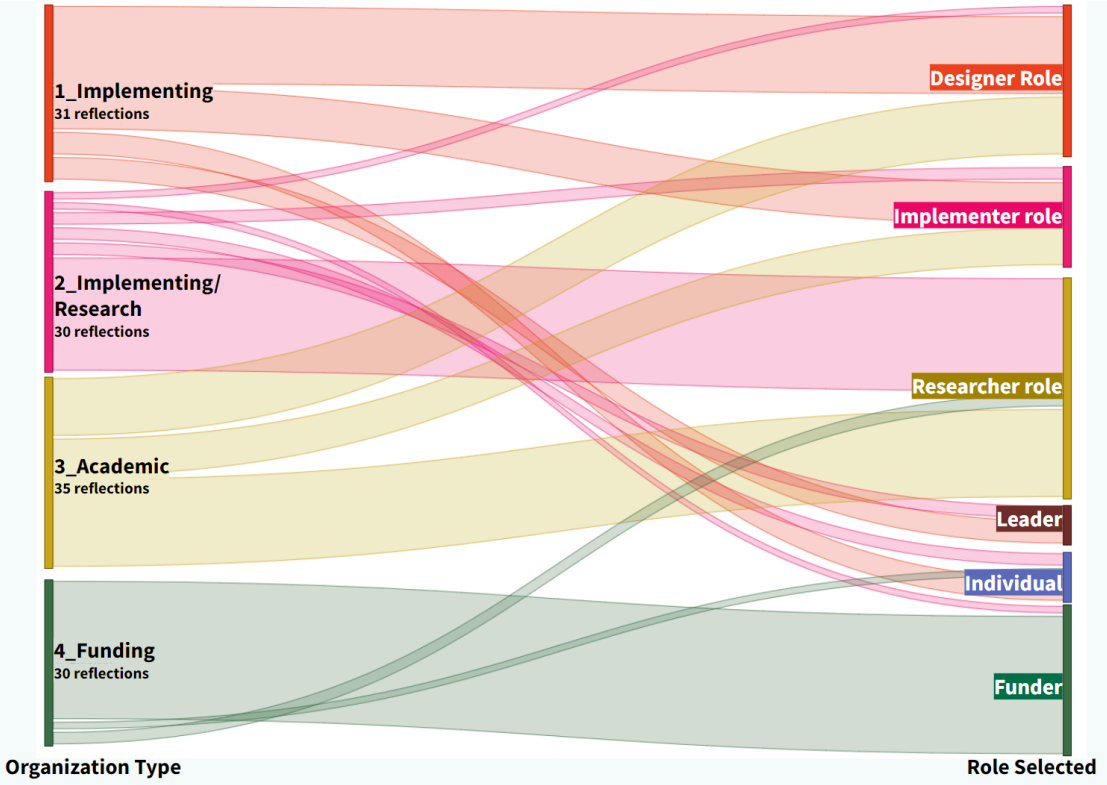
Engaging with *(re)imaginator*

During the 4 workshops, 30 participants completed 126 reflections, answering an average of 4.2 questions per person in 15 minutes. While this study did not include community-based or government organizations, Figure 5.3-1 demonstrates that participants answered questions aligned with the stakeholder roles I assigned to each organization during the recruitment phase (e.g., participants from implementing organizations selecting

intervention *implementer* and *designer* roles, while funders chose the funding role). This alignment indicates that the study workshops engaged different stakeholder types. This is important not only for testing the intervention but also for our goal of building a tool that reaches stakeholders across the global health *Matrix of Domination* (Chapter 2.4 and 4.4-1).

Few participants selected the "Individual" role suggesting that the current defined roles resonated (Figure 5.3-1). Additionally, few participants selected the "leader" role despite the recruitment criteria of leader in their organization. This makes sense as we both did not host workshops with any government or large-scale institutions *and* the subtext on this role button defined this group as those who "work in government or key institutions." In our discussion, many participants noted a desire to select *more than one role* in the *(re)imaginator* tool. They shared that they often occupy many project roles at once so selecting multiple roles would be helpful to get a variety of questions to consider as they used the tool.

Figure 5.3-1. Sankey diagram displaying how the questions answered by organization type aligned with their role section.



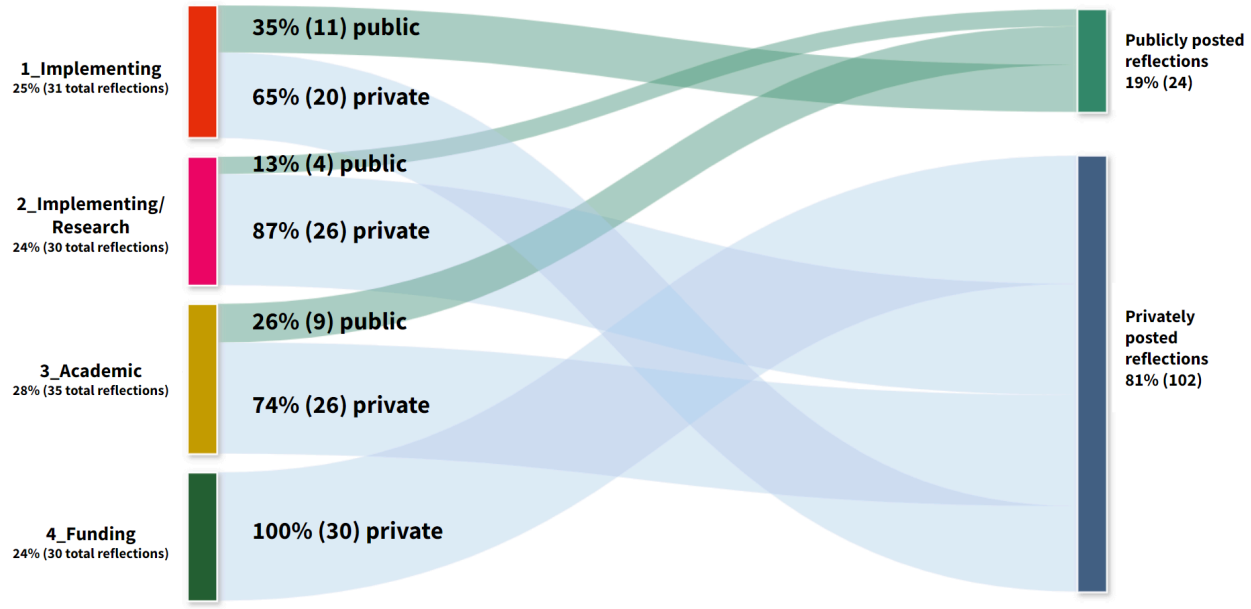
Posting private reflections

When submitting reflections on the *(re)imaginator* website, participants had the option to send their reflections either 'privately' to the research team or to post them publicly on the *(re)imaginator's connect* page. Out of the 134 written reflections, participants posted only 19% (24%) publicly (Figure 5.3-2). Participants from the implementing organization had the lowest proportion of *private* posts (65%), while funders shared 100% of their reflections privately. Participants with higher education levels (e.g., terminal graduate degrees) tended to choose

public posting more than those master's or bachelor's degrees, perhaps indicating more confidence and comfort due to seniority.

Overall, this indicates a reluctance to share reflections. Participants gave several reasons for choosing to post privately. Several participants mentioned a hesitancy to share "unpolished" reflections, while others expressed worry that it may bias other practitioners or cause harm. This may also be ascribed to reasons including first-time use of the tool or lack of exposure to the public posting page to see others' reflections. Yet, there was overall discomfort posting publicly even though the (*re)imaginator* did not collect specific identifying information (e.g., names, organizations, and locations). While not mentioned in our study, per our formative research findings Chapter 4, we also wonder if the workshop structure, requiring participants to reflect synchronously with their colleagues, added additional risk for their posts to be identified and, potentially, critiqued.

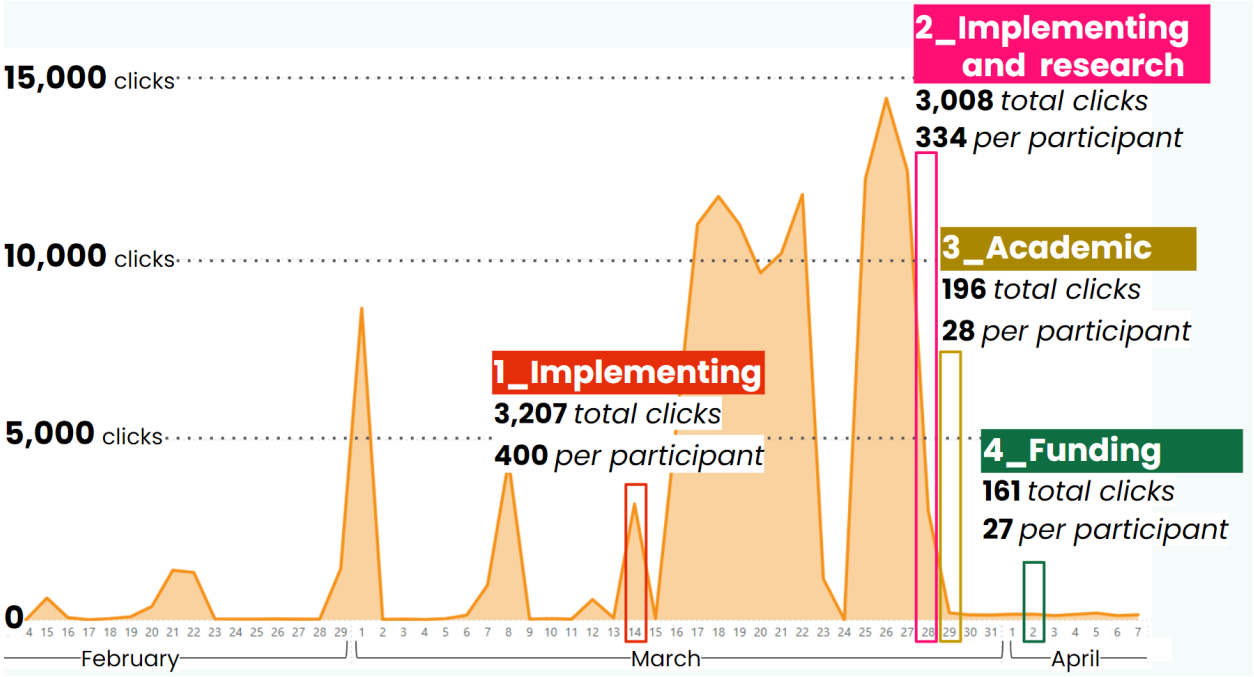
Figure 5.3-2. Publicly- and privately posted reflections on (re)imaginator by organization type.



Click data

We intended to use click-data patterns on *Step 3* of the *(re)imaginator* to detect any trends in frequently skipped questions so we could refine the prompt library. As participants selected the question prompts they wanted to reflect on, the *(re)imaginator* website counted whether participants opted to skip a question deemed confusing. However, web crawlers were also "clicking" on the site every day, and our system could not distinguish between web-crawler clicks and user clicks (Figure 5.3-3). The site registered over 10,000 clicks in a single day on several occasions on just these two buttons. Even when we tried to analyze click data on the specific workshop days, we were unable to distinguish web crawler noise from the user-driven selections. As a result, future platforms will likely face a similar challenge of distinguishing between genuine user interactions and automated web traffic, particularly if these interventions also seek to maintain a high level of user privacy as we did (e.g., limited cookies, no site logins).

Figure 5.3-3. Number of clicks of"skip" and "skip confusing" on Step 3 of the reflection intervention over time with the workshop days highlighted, total clicks and average clicks per participant in the workshop.



Perceptions of *(re)imaginator*

Rating the technology

The TSRI measured participants' views on whether the *(re)imaginator* technology itself supported key reflection dimensions of *insight, exploration, and comparison [19]* (Chapter 3.2). Participants generally had neutral ratings for all three dimensions (Appendix 4, RQ2.2 for analysis). Participants from funding organizations had the most negative overall ratings of the tool's ability to support reflection. They rated *(re)imaginator* as neutral or below on all dimensions except for the two below (see Appendix 4, RQ2.2). The only positive findings were that the tool supported participants to:

- Think differently: 50% somewhat agreed the tool led them to think about their work in new ways, though, given a right-skewed distribution (towards more neutral or negative perceptions), this was not a widely held insight
- Enjoy the experience: 75% of participants agreed that they enjoyed exploring the reflection question with the tool (see Figure RQ2.2-6 and Figure RQ2.2-8 in Appendix 4, RQ2.2)
- Notably for both of these measures, participants from the implementing and implementing/research organizations reported the highest levels of thinking about work in new ways and enjoying the tool. These organizations also consisted of mostly non-North American participants. This highlights an opportunity for reflection as being a way to embolden scholars from the Global South to advocate for new ideas and perspectives, a key component of "epistemic disobedience" [120, 121] and commit direct acts of enriching the knowledge used to inform practice [4, 5, 21, 121].

Amount of time

Directly after using the *(re)imaginator*, 61% of participants reported that using the tool for 15 minutes was "too little time" to reflect. Most thought 30 to 45 minutes would be sufficient, and several mentioned that they needed to "think more" given the newness of the tool. Participants noted an interest in repeated use of this kind of tool, hinting that the shorter reflection periods work over time as they get used to the tool.

Adding structure

Contributing to the reports of too little time were several reports of a desire to know how many questions were in the tool. Though not directly advised to reply to *all* questions, several participants seemed determined to do so. Many participants felt the current tool felt "unstructured" and "random" and expressed participants a desire for a more structured question sequence. Several recommended a feature to create a personalized "reflection panel" where they could curate question sets based on their needs or perceived relevance to their work. Additionally, several recommended providing context upfront about the purpose of reflection and guidance on specific aspects to reflect on to avoid confusion.

Western-centric and a need for refinement

Some participants felt the tool was "loaded with assumptions" with very Western-centric language and an overall assumption that "no one is reflecting on their work." Thus, the tone and vocabulary would need to be tailored to ensure it meets a broader set of vantage points and needs, like different languages and cultural contexts. Some participants felt that some of *(re)imaginator's* questions seemed to unnecessarily assume that the audience had never reflected, and suggested rephrasing these questions. Additionally, tools must be more locally customizable (language, phrases etc.). As one participant described:

> This [*(re)imaginator*] was geared towards… a demographic who's gone through, kind of like, the growth of [Diversity, Equity and Inclusion] initiatives at universities and institutes that… that hasn't happened everywhere… in every country. And I think a lot of that vocabulary and stuff that we now think of as common vocabulary came out of that movement …. And would be kind of foreign to people that haven't… done that, like a special, I mean, even just like not even thinking of {Country where organization operates} versus the US, but even like doing this in France versus the US would be received very differently.

Even the title of the intervention was critiqued as being Western-centric. One participant noted the use of parentheses in *(re)imaginator* "is a very critical geography, critical approach. But I think if you're not familiar with that field of literature, you wouldn't even know what that means." Further research into cultural interpretations and customized designs would likely enhance the intervention's usability and appeal to this broad group of stakeholders.

5.3-2. Descriptions of personal and organizational reflection practices before (RQ2.1) and after the workshop (RQ 3.3)

Baseline personal and organizational reflection practices

Before using the *(re)imaginator*, participants reported high levels of personal reflection. Among the 30 workshop participants, 29 (97%) reported reflecting in the month before the workshop. Nearly 50% reported they reflected on their work five or more times in the last month (Figure 5.3-2.1). There were no observable differences of reflection frequency by age, gender, or career level (see Appendix 4).

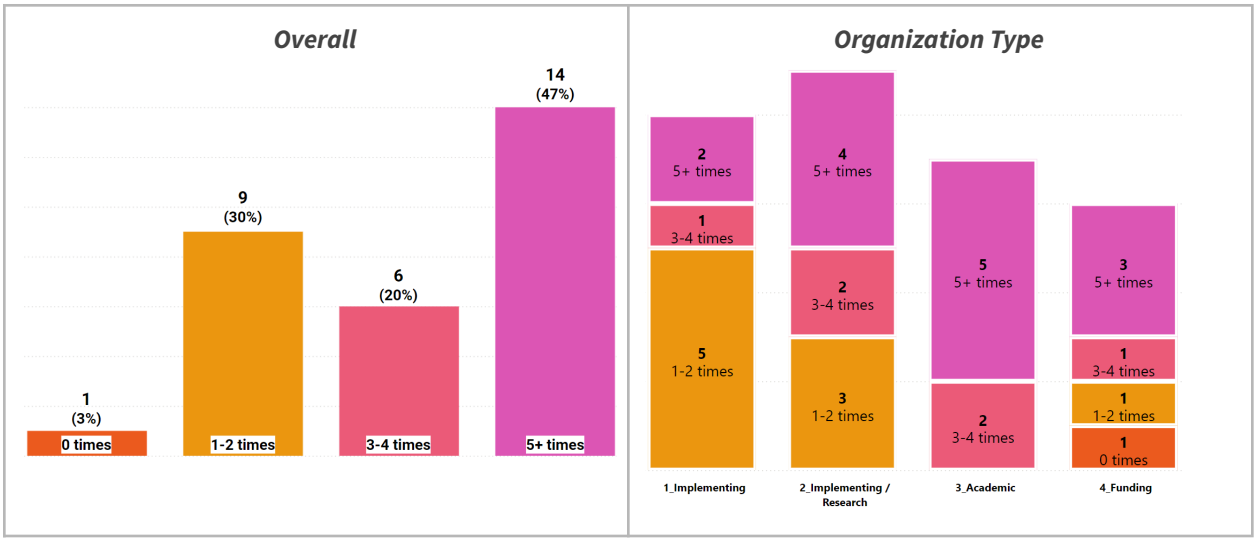
While participants acknowledged the importance of personal reflection, they vaguely described how they reflect. None mentioned specific tools or methods that they used for their personal reflection practices. At baseline, participants shared they mostly reflected on their project impacts on communities and stakeholders. This scope aligns with the *(re)imaginator*'s design, which focuses on guiding practitioners to reflect on one, specific project.

Several reported they regularly reflected on the future of global health and adapting projects to meet evolving population, legislative, and scientific landscapes. Participants from East and West African shared using annual performance reviews for their reflection practices, with emphasis on documenting professional achievements and planning career advancements. Additionally, several participants, mostly from North America, also described thinking about whether they were the right fit for their roles. As one participant described,

> My role… requires thinking about the future of the team and growing our work. Part of that is considering my role-- am I the best person? Is there someone who has additional skills that could be in this role and on what timeline?-- and also how we grow the team overall to meet the changing needs of the organization.

While many participants reported at baseline that their organizations supported reflection practices, only the academic group explicitly described these practices as occurring regularly through both a social justice working group and a partner advisory council. Most participants shared that their organization conducted reflection during quarterly or annual *program* review meetings to reflect on their work. Participants also noted that this reflection supported their *personal* reflections on their work, albeit indirectly. This highlights a potential opportunity for integrating personal reflection tools *within* project performance reviews to formalize the practice. Several participants were unsure whether their organization reflects, with one participant understandably highlighting that an organization cannot reflect, but instead it would be individuals within the organization, suggesting a poorly designed survey question. Finally, two participants shared that their organizations failed to learn from past mistakes, showing their perspective of a disconnect between the act of reflection and resulting action.

Figure 5.3-2.1. Frequency of personal reflection on global health work in the past month, overall and by organization type.



Follow-up personal and organizational reflection practices

Most participants indicated a desire to continue reflecting in the mid-session survey. At the 2-week follow-up, 78% of the 23 respondents reported reflecting since the workshop yet only 6 participants (26%) used the *(re)imaginator*. This suggests that participants continued with their own, vaguely defined reflection practices. Fourteen of the follow-up respondents (61%) reported structural barriers like the lack of time given their focus on other work priorities, with one stating their barrier was "being always too busy to think."

For the 23 respondents who completed the baseline and follow-up survey, their reports on whether their organization reflects dropped from 87% to 35%. This decrease, coupled with a rise in participants selecting the "unsure" category (13% baseline to 35% follow-up), has several plausible reasons. First, participants might have been less aware of specific organizational reflection practices during the follow-up period. Second, the follow-up period may have not coincided with specific review meetings that were reported as a key time point for reflection. Yet, we wonder whether the workshop influenced how participants defined organizational reflection practices. In one workshop activity, participants envisioned and described what successful reflection practices *could* look like in their organizations. This exercise could have altered participants' understanding of what a "good" organizational reflection practice looks like, potentially leading to the lower follow-up rate. Clearly, more research is needed to understand the factors of this change.

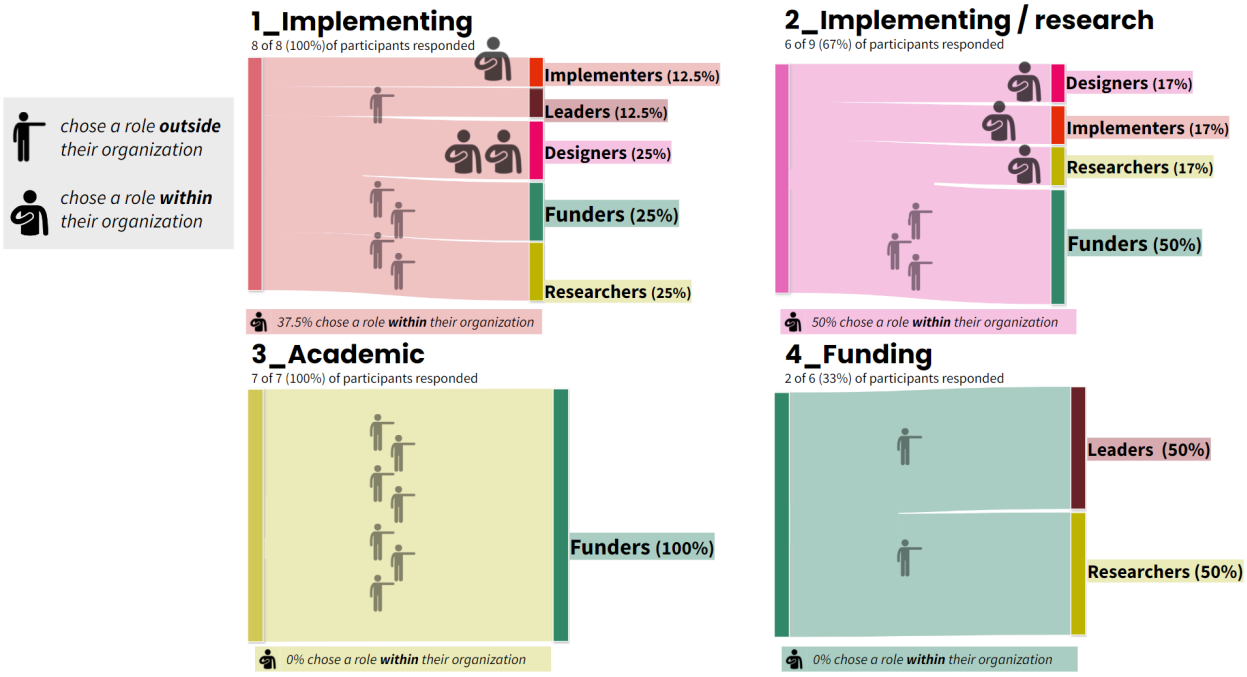
Key organizations and roles to stoke change

In the follow-up survey, respondents were asked to choose one group to reflect more on their work and why they would choose this group. Overall, only 6 respondents (26%) from Implementing and Implementing/Research organizations identified *themselves* as the group they would select; most participants pointed to roles traditionally outside their organization's focus.

Most respondents (52%, n=14) selected funders as the group that should reflect (Table 5.3-2.2). This aligns with the power asymmetries described in Chapter 1 where funding organizations "significantly influence global health

priority-setting" [20]. Participants echoed this sentiment, noting that change within Funding organizations would have the greatest impact. As one participant described, "Ultimately, the work of all the others is dependent on the funders. Funders can also create top-down change." All seven academics identified funders as the target group for increased reflection, highlighting a strong dependency of their work on funding decisions.

Figure 5.3-2.2 Distribution of organizational choices for increased reflection, disaggregated by organization types.



However, participants from the funding organization were the least positive and supportive of the *(re)imaginator* tool. They gave the lowest scores for TSRI (measuring whether the tool supported reflection) and also reported the lowest transformative learning scores. These participants emphasized a desire for the question sets to "build on one another" to guide them and ideally deepen reflection on the selected project.

One participant from the funding organization provided a particularly insightful critique. While they acknowledged the tool's potential value for some individuals, organizational adoption would be very difficult. As they stated,

> Well, so, I mean, the challenge is that… funding organizations such as {names org} have a pretty extensive process. … And so I think if you're trying to take the route of a large funding organization using this tool, I actually think that that would be very difficult…for them to link into existing processes.
>
> The effort to change a process in {names org} is quite um quite Herculean. So I think maybe you're thinking of the wrong audience. This is not to say that there wouldn't perhaps be individual practitioners or program… you know, the program officers who might find, 'oh, this is helpful for me'. You know, there are times of the year where we commonly come up with concepts and share them with

> a group and figure out what we're gonna fund for the year. So I think sort of on the individual contributor level, it would probably, that would probably be… potentially be… an initial audience. I think actually trying to get it into a funding organization, at least taking this organization as an example, that would be very difficult.

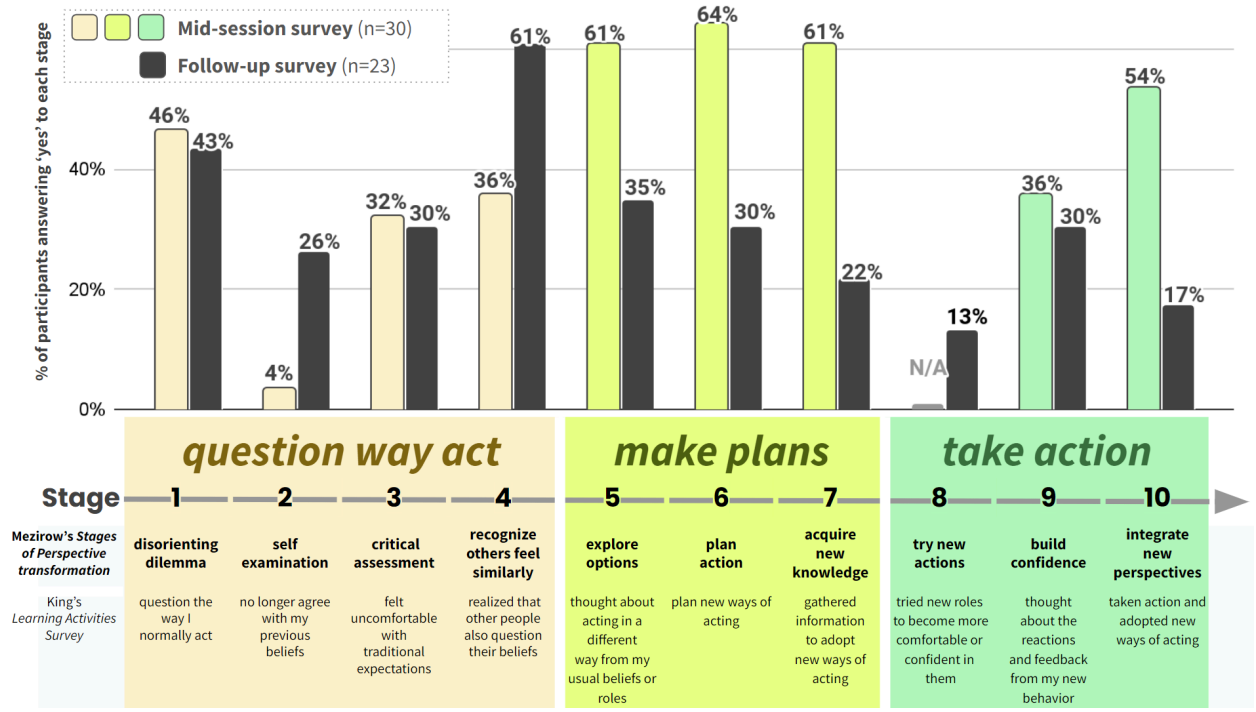
Overall, these findings suggest global health stakeholders identify funders as a key audience who should reflect, given the power they have to change the field. However, *(re)imaginator* tool did *not* resonate with participants from the Funding organization. Moreover, this audience noted that integrating reflection tools, or changing any process within their organization, was "Herculean." This highlights opportunities for more research on how to design for reflection *with* individuals from funding organizations to tailor reflection touchpoints into their practices.

5.3-3 Perspective transformation, planning and action (RQ3.1 and RQ 3.2)

My main dissertation goal was to measure whether critical reflection practices would prompt practitioners to think differently and take new actions (e.g., incorporating new information or practices into their work). This resonates with growing acknowledgment in global health that epistemological diversity is a critical element to disrupting the status quo [4, 21, 121]. Figure 5.3-3.1 compares mid-session versus follow-up responses for each step in Mezirow's theory of transformative learning as measured by the LAS. I added the three general categories "question way act," "make plans" and "take action" to distinguish between key phases of these stages.

Immediately after using the tool, only 46% reported that the tool supported them in questioning the way they act. Overall, the scores were low for provoking new thinking. Surprisingly, at baseline, over 60% of participants committed to all stages in "making plans" to act differently. Finally, over half (54%) of participants agreed with the highest stage of transformation, where they planned to take action based on their use of the tool. However, at follow-up, few stages were sustained, indicating that few participants kept their commitments. For example, only 4 of 23 (17%) of respondents reported actually integrating new ways of acting into their work.

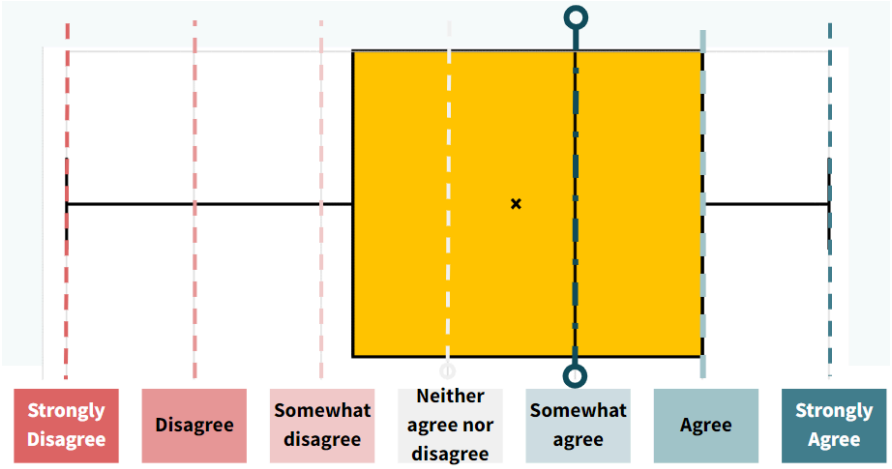
Figure 5.3-3.1 Mid-session survey (n=30) versus follow up (n=23) showing each stage of Mezirow's Perspective Transformation Scale as measured by the Learning Activities Survey. I added phrases to describe how I think about the three phases.



(re)imaginator moderately provoked new thinking

As measured by the LAS, nearly 50% of participants agreed that using *(re)imaginator* caused them to question the way they normally act, reaching stage 1 of perspective transformation. This finding is echoed in the TSRI, where 50% of participants somewhat agreed with the statement "*(re)imaginator* led me to think about my work in a new way" with left-skewed (more positive) results (Figure 5.3-3.2). As one participant described, "It force [s] yourself to see what you don't do and face it." This highlights that *(re)imaginator* provokes around half of participants to challenge their current beliefs. That said, just after exposure to the tool, none of the other questions in this category were striking. Additionally, as reported in the follow-up survey, there was little change in this feeling over time for the 23 respondents.

Figure 5.3-3.2 Mid-session survey (n=28) of TSRI question "(re)imaginator led me to think about my work in a new way" where the number is the median score and 'x' denotes the average score.



Commitment to gathering new information: Just after the tool, over 60% agreed that the tool provoked them to plan new ways of acting (Figure 5.3-3.1); however, very few reported following up on these commitments. At follow-up only 39% (9 of the 23 respondents) reported gathering new information dropping from 70% to 39% for these participants. This highlights a potential gap between the initial enthusiasm sparked by the *(re)imaginator* tool and participants' ability to translate that into concrete action within their regular workflows. However, it may also reflect that a two-week period is insufficient time to gather new information and make plans. Interestingly, implementing organizations consistently showed the highest interest in gathering new information throughout the study. This suggests the tool may be particularly effective in stimulating a desire for fresh perspectives among those actively engaged in project implementation.

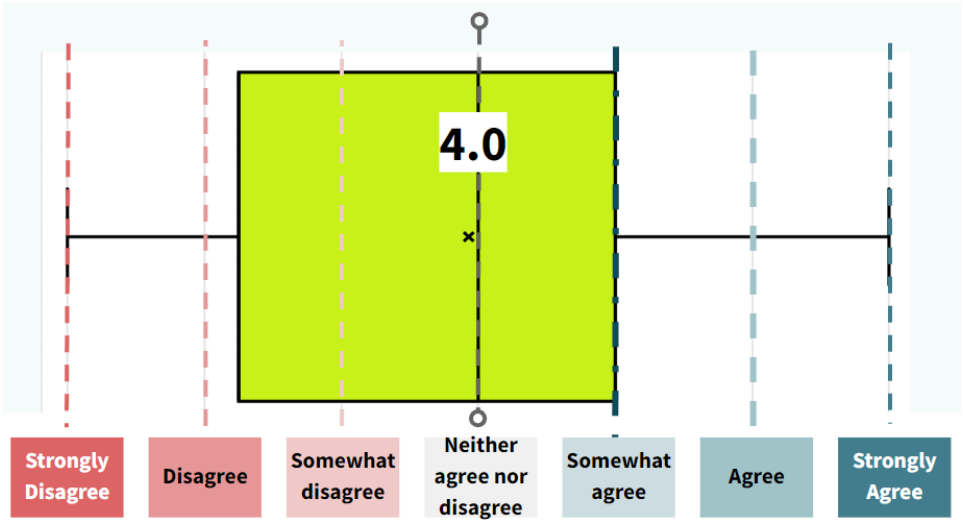
Desire to take action with little follow through: A major goal of this intervention was to see whether reflection prompts global health practitioners to take actions. As one participant aptly described,

> The thing I want to add… [about] change… because for me, when we reflect and change doesn't happen, then it's pointless. We can have the best tools, we can have the best intentions, but after reflection, we'll all walk out and continue our business as usual. That is… that's the change for me is a very critical part of uh a positive reflection… committed to at least doing… having changing things.

At the mid-session survey, over half (54%) of the 28 participants shared in the LAS that they "will" take action based on their experience using (*re)imaginator,* indicating the possibility of moving the *(re)imaginator* provoking stage 10, the highest level of perspective transformation (Figure 5.3-3.1). However, of the 14 respondents to the follow-up survey who had committed to taking action, only 17% (4) reported that they had done so at follow-up. While 18% of people didn't respond to the follow-up, we do not think these results would significantly change if they had answered the survey since most non-respondents had not committed to taking action at mid-session. The *(re)imaginator* tool demonstrates ways reflection can stoke individual recognition of their assumptions, though more work is needed to help practitioners enact change.

Notably, the TSRI score showed neutral to negative responses for a similar question: after using *(re)imaginator* "I will change how I approach my work" (Figure 5.3-3.3). This may be explained in possible social desirability bias, where there are bigger declarations for changing while in a workshop with colleagues and then minimal follow-through. These findings also suggest that a single session act of reflection is unlikely to provoke immediate action, noting that several desired more ongoing tools to support reflection. Finally, we note that the follow-up window may have been too short to capture meaningful action, especially considering the pace of health project design, implementation, evaluation, and funding cycles.

Figure 5.3-3.3 Mid-session survey (n=28) of TSRI question "after using (re)imaginator I will change how I approach my work" where the number is the median score and 'x' denotes the average score.



Importance of social comparison and interaction for provoking change

While these are trends rather than significant results, these data indicate that the tool's current design provokes new thinking, commitment for planning and taking action, but limited follow through. This difference may suggest a gap between initial intentions and participants' ability to translate their reflections into actions.

This finding resonates with strong feedback from workshop participants for adding features that could better connect their reflections to action. Participants highlighted a desire for an added feature where they could write out an action plan just after writing their reflections in *(re)imaginator*. They proposed "Action-Oriented Prompts" to bridge the gap between thoughtful reflection and outlining tangible steps for improvement. As one participant described, "I think that, you know, it's easy to click a button [saying you will take action] and then move on and forget about it. But if you're kind of brought to write down, what are the actions I might take? What's my next step? I think it's more likely than that, that will happen." This recommendation aligns with research showing creation deepens reflection [114] (Chapter 3.2.4), where the tool could ask participants to write a reflection and create a plan for action if they planned to do so. Integrating additional prompts to support action planning may also enhance follow-up.

Participants wanted to see how other people reflected and the impacts of their reflections. They highlighted that the system could have a pop-up of how others reflected on the same question to provoke deeper individual

thinking. They also suggested linking relevant resources, such as journal articles, case studies or videos, with a specific request to couple reflection questions with tailored resources to support action. Participants shared that these features would not only help them reflect more outside the tool but also gain information they could share with others. The participants did not mention the *(re)imaginator's learn*—which serves as a general resource library—and future designs could easily connect and display specific resources within this library to the existing reflection prompts.

This addition echoes design for reflection literature that social comparison can support deeper reflection [18, 134, 157] and connect to business literature on how social mechanisms provoke organizational and field-level change [51]. However, social features such as sharing other's reflections to the same question or their action plans would require that participants publicly post, so these could be shared with other users. These findings suggest future tools should be better tailored to connect participants' reflections to specific actions, and enhance connectivity and comparison.

Importance of group discussions

Additionally, this study shows some evidence about the importance of the workshop group discussions in helping participants see that their colleagues "also questioned their beliefs." In the mid-session survey, ten participants (36%) reported that using the tool helped them see that others also questioned their own beliefs. For the 23 participants who also responded to the follow-up, at baseline 39% (9) agreed but at follow-up 70% agreed that the tool helped them see that their colleagues question their beliefs.

Participants were introduced to but not asked to use *(re)imaginator's connect* page, where publicly posted reflections are displayed to stoke social engagement. Additionally, no participants mentioned the *connect* page in the workshops or surveys, highlighting that they likely did not review this component of the intervention meant to stoke connection with colleagues. This uptick may indicate that organizations hosted other forums between the workshop and follow-up where colleagues within organizations exchanged ideas. However, there were no visible differences between organizations. This leads us to believe that the group conversations activity in the latter half of the workshop may have supported this uptick in participants seeing their colleagues also questioning their beliefs. The low baseline also suggests that global health practitioners may currently be isolated in their thinking, lending further evidence to the importance of stoking conversation and connection. Facilitated group use of interventions like *(re)imaginator* may unlock potential. Participants voiced the importance of and desire for connecting their individual reflections with group activities. These findings echo the theory of change in the *Matrix of Domination* framework for global health presented in Figure 4.1. Change relies on empowerment of groups of people of the importance of dovetailing individual reflection with groups who come together and grapple with approaches to take individual and collective action.

Integrating into organizational practice with psychological safety

The findings above also directly connect with participant desire for more organizational integration of reflection. At follow-up, 96% of the 23 respondents would recommend their organization integrate reflection into practices. Participants emphasized reflection as a "first step to change" and highlighted that integration would take minimal resources (e.g., embedding into existing meetings, reports etc.). Given that participants identified time constraints and competing priorities as major obstacles to personal reflection, organizational commitment to

encourage and integrate reflection practices is essential. Several participants highlighted the importance of carving out time to support reflection and group conversations, as one described,

> … I wonder if adding in an additional time for reflection that's different from our, you know, packed weekly study call… where we're trying to add it in as the agenda item right before any other business… you know, would be really helpful to have these like spaces to…think and reflect together.

However, reflection was also deemed "risky to do really honestly" and that it can be "alienating…for me personally. So I'm gonna kind of infer that [it is alienating] for others." Participants described a need to create psychologically safe environments to minimize these risks. They cited both personal and organizational risks that can come from open reflection—including losing funding, projects, promotions etc. As one participant described,

> I'm also thinking about the power dynamics that are present within those teams would make it really challenging to have these conversations candidly because a lot of people's…. like, people could feel like, "oh if I say something critical, will my contract get renewed?" You know, there's like real, not psychological safety, but also just like material safety of being critical about how things are going and how they could get better. So I… I would love to hear, like, ideas of or ideas from tools, of how to overcome some of those issues. Because I think that the power trust and safety dynamics are a little bit harder for me to engage.

These findings align with Fleck and Fitzpatrick's findings on the importance of core, contextual conditions to promote reflection: *time, structure*, and *encouragement* [61]. Participants in this study reported that these conditions do not currently exist in their organizations.

Participants proposed several ways to create safer environments for reflection and discussion. Participants from all organizations, except the Funding organization, noted that existing power structures discourage open and honest communication. Some participants noted that if their organizational leadership expressed more openness to change, with their emphasis on being open to changing practices, this would promote safety and candor. As one academic recommended, "pushing the leadership team to be more open to change and taking risks" is an important criterion for connecting reflection to action. Many also cited that face-to-face conversations (rather than virtual meetings) were an critical element to creating a safe environment, with several participants noting that their geographically dispersed teams made this difficult.

Participants also highlighted the importance of not blaming or shaming individuals during group reflection practices. This kind of feedback, they suggested, can make reflection disempowering, particularly given that many issues are systematic. As one described,

> And I think that part of that is also making sure that reflection isn't disempowering of people when a lot of the issues are systemic. Um not to shift blame to you know, from individuals to systems too much… but, you know, uh a lot of us in academia are operating under sort of traditional structures like, you know, we have to be PIs on grants, and first or senior authors on papers and all this sort of stuff that creates incentive structures that makes it really hard… to create the kind of change we want to see.

This, again, is recognition that individual-reflection can empower individuals, but radical change requires groups of individuals who can candidly express challenges and desired actions. Participants also noted a need to extend and create psychologically safe environments to reflect with their global health partners. One participant highlighted that if she and her colleagues within her organization felt uncomfortable, then how might external collaborators feel. As she described:

> It's just I'm having flashbacks back to the projects that… we run with the different partners…. if *we* in this room—who are the managers… {gestures air quotes} quote managers, PIs, project leads— feel that way…. God, I feel like the feeling from our partners is quadruple that. The ability for them to… walk in the room, work with us, and feel like it's an environment where they feel comfortable expressing themselves… that they feel trust is there and they feel that there will not be retaliation. So I think yes, the reflection is important for us here. But I think it {whistles for emphasis}, *we* need to take it even a step further. Also to think about, wow, how do our partners… feel regarding those issues?

Several practitioners highlighted a desire for more community and partner feedback, and they suggested that *(re)imaginator* add features to include these roles. Providing community-members and patients with tools to reflect on their experiences within the health care system could empower more critique and open more opportunities to improve health systems.

While the *(re)imaginator i*ntervention supported nearly 50% of participants questioning the way they normally act (stage 1) and over 60% commit to plan (stage 6) and try new ways of acting (stage 10), none of these trends were durable with follow-up participants. The only major increase between baseline and follow-up was for stage 4 where using *(re)imaginator* helped them see that other colleagues also questioned their beliefs. This, however, we ascribe not to the technological intervention but more likely the group conversations. Our findings highlight a lack of established mechanisms for group reflection among participants. Only the academics mentioned a group that regularly meets to reflect on their work; while others gave vague explanations for when and how their organization reflects.

5.3-4 Design strategies for embedding reflection into global health practices

Throughout the workshops and surveys, participants made many suggestions for how to improve *(re)imaginator* and design better reflection tools that could be embedded into practice. Again, 96% of follow-up respondents recommended that their organization integrate routine reflection practices, yet only 35% noted that their organizations had a routine practice.

Tension and flexibility of reflexive prompt order and roles

While 75% of participants reported that they enjoyed using the tool for reflection, many participants reported that the reflection process felt unstructured and random. The playful ludic design choice to display a random order of questions, like a Magic 8-ball, seemed to cause confusion and misalign with some participants' expectation that the intervention questions "would build on themselves."

Participants recommended the ability to create a personalized "reflection panel" where they could see all the question options and then select a set of reflection questions to meet their reflection goals. One participant suggested a preliminary survey that users could fill out to guide question filtering and selection. Participants also

highlighted a desire to select *more than one role* in the *(re)imaginator* tool. They shared that they often occupy many roles at once on a project so selecting multiple roles would be helpful to get various questions to consider. This feature could be supported by the current design to allow a participant to access questions from each of the roles selected.

Others recommended organizing questions by project stages or more "pre-defined" question packages on specific themes that participants could explore. Despite my intentional alignment of current role selections with the stages of project implementation (e.g., planning, design, implementation; see Table 4.1.2), participants did not detect this alignment. This suggests a need to design with more flexibility in mind, allowing participants to have a variety of ways to access relevant questions. Adding temporal project tagging to the reflective prompts library is feasible. These design ideas may support a stronger connection between reflection and action, particularly if they are guided to questions they think are more relevant to their project or personal needs.

However, these preferences highlight a design tension for reflection interventions. With our goal to provoke expansive thinking, the random order forced users to be exposed to various questions. We made this decision both to challenge practitioners to engage with a broad selection of prompts. Allowing users to select a panel may make the process feel smoother, but it also may allow participants to select only convenient questions and therefore allow them to bypass prompts that may provoke more critical reflections. This decision also allowed us to better analyze question preference in a future study. If we had ordered the questions, our research study would have likely only gotten feedback on a subset of questions. Within the 15-minute activity participants answered an average of 4 questions and were exposed to many more, but ordered questions would have greatly limited exposure and testing. That said, Fleck and Fitzpatrick's *Levels of Reflection* categories (described in Chapter 3) offers a useful schema for supporting a more logical question order. By tagging questions with these levels, participants could start with easier questions that prompt project descriptions and then advance to questions that would provoke deeper reflection. This tagging system could also preserve an element of randomness as participants could be exposed to different sets for additional testing. That said, this approach would need to be validated to connect the "gold standard" of reflection response depth and the question categories (e.g., does a question tagged "critical reflection" provoke this level of reflection?). In a systematic literature review, Ortiz-Lampier found that existing methods for qualitatively measuring reflection depth is limited, labor-intensive, and relevant studies lack theoretical grounding common to qualitative studies [124].

Future reflection interventions could test various designs of how to represent roles, stages of project implementation, allowing the user to select "random order" or "guided order." Additionally, the intervention would benefit from clearer instructions that the intervention aims to guide deep reflection, rather than have participants answer *all* questions in a category. Many participants mentioned a desire to know the total number of questions in a particular role, so they could "pace themselves" and make more informed decisions around whether to skip or answer a specific question.

Design to integration reflection with practice

Future interventions should also carefully research and design for organizational integration to promote routine reflection and stoke opportunities for social exchange. Designers should also consider adding design features that can support repeated use by the same participants, where, perhaps, users could log in to see previous reflections, add comments, and continue their practice. Bentvelzen et al. noted in their review that "current

interactive technologies rarely support reflection as a social activity, but instead focus on individual cognitive processes" despite evidence that reflection is encouraged by conversation [18, 19]. They cite Mols et al. research where 85% of participants in their reflection intervention reported reflecting through conversations with partners, friends, and colleagues [18, 19]. Study participants echoed the importance of dovetailing individual reflection with group conversations. Our study results suggest that even a 30-minute group conversation may have increased participant recognition at follow-up that their colleagues "also questioned their beliefs." This finding connects back to our *Matrix of Domination* model for global health, where individual reflection should be paired with group/organizational empowerment to catalyze disruption and fresh action. Change comes through individuals who build organizational camaraderie, noting that when done elegantly, could alleviate feelings of individual reflection being an "alienating" experience.

To echo the playfulness, designers could also consider features that could randomly email participants their reflections. These intervals could be controlled for research into ideal frequencies to sustain reflection practices, and could integrate demographics and patterns over time to further tailor these kinds of features. Our study indicated that participants' reflection frequency was lower after the workshop, indicating the utility of features to support touchpoints.

Importantly, the designs must be careful to prevent social or professional consequences of blunt reflections. Since our workshops happened synchronously with colleagues, we wonder if this led to more private posts. Design features like posting public reflections in random order, at random intervals, or using community moderators or AI tools to block proper nouns or other details that may inadvertently disclose identity. This is particularly important to mitigate personal risk so that reflection can get more safely embedded into practice. There is a rich body of research from HCI for online forum moderation, for example, that could guide this design research.

Speculative design for psychological safety

Finally, of note, participants described the need for a psychologically safe environment where they could take risks, be candid, and work though the complex, systematic issues clouding their approaches. As currently designed, *(re)imaginator* does not appear to feel safe to participants given that 81% of reflections were posted privately. More research is needed to understand how tools like *(re)imaginator* can be designed to create a culture of safety that can promote learning. There are ample HCI studies around designing for community safety in interventions like neighborhood monitoring apps [36], dating apps [94], technologies to support Transgender people [151] and social media [108, 147]. More research is needed to distill critical design features that can enhance a users perceptions of safety when reflecting and how these impact their use of the tool.

Of note, one participant noted the power of the speculative design activity (Table 5.2-3) as a method that depersonalized reflection and made them feel safer. He noted that activity for the group to describe a fictional future where their organization was successfully implementing reflection and knew it was working, helped participants use "the royal 'we'" to speculate on practices and ideas. This future thinking also gave practitioners the invitation to think outside the box to describe how reflection could be integrated into organizational practice and hypothesize on what kinds of impacts it would have. This could be a helpful method for co-designing design interventions that integrate reflection into organizational practices.

5.4 Limitations

Single-session, quick exposure to the intervention

This intervention relied on a single, 15-minute exposure to the reflection tool. Given that most participants shared they had too little time to use the tool, this may have influenced more negative feelings about the tool feeling “unstructured” or “chaotic” as they did not have much time with the tool. Future studies should consider repeated use of a reflection tool, as this would both reflect participants' desire for more integration of tools into practice and support getting “warmed up” to a tool over time to see how use patterns change. Repeated use of the tool may also increase the likelihood of a practitioner taking action based on their reflections. This study describes trends in impact of a relatively short exposure to reflection tool; while some thought this was sufficient to provoke practice, many desired more time and repeated use of the tool.

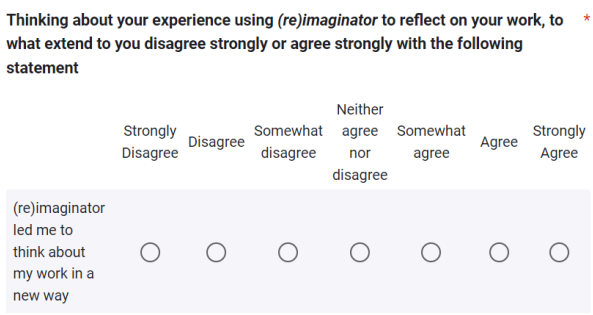
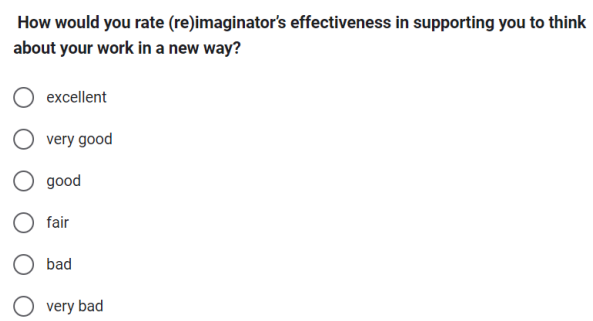
Survey tool limitations

There were also several notable limitations to our data collection tools. First, we did not capture potential parallel interventions or activities that may have influenced participants' reflection practices. For example, the study did not ask explicitly about Diversity, Equity, and Inclusion initiatives that may have played a role in their reflection practices, nor did it ask about activities that participants identified as common opportunities for reflection (e.g., annual reviews or project planning). While the baseline survey asked participants to describe their personal and organizational practices, these responses gave brief summaries and were light. Future research should collect more contextual information about participants' personal reflection practices at baseline and follow-up.

In reviewing data from the *Learning Activities Survey,* several questions are leading and may promote positive answers due to social desirability bias. For example, 100% of participants at baseline answered *yes* to “Do you consider yourself a person who reflects on your work?” This question seems to position reflection as a personal *characteristic* rather than a practice. Additionally, answering ‘no’ to this question has negative connotations, particularly for self-selected participants who signed up to test an intervention to promote reflection.

Survey tool ideas: An alternative approach may be using a Likert scale for response options rather than the existing yes/no/unsure scale. This could enable the LAS to identify subtle shifts and incremental changes through Mezirow’s Transformative Stages [112]. Of particular note for designers around designing Likert Scales, one study from the field of survey science found that reformulating Likert Scales into an “Item Specific” format gave more reliable and valid responses (see Figure 5.4 for an illustrative example). The authors hypothesized that, “questions with the Item Specific response options avoid acquiescence, minimize cognitive burden… [that] may yield better quality of self-reports…” [149].

Figure 5.4 Illustrative example using a question from our TSRI survey in the "Agree/disagree" form versus the 'Item Specific' format [149]

TSRI Question in the Google Survey we used, with an agree/disagree Likert Scale:	
Example of Item Specific framing [149]	

We also learned that it was inappropriate to extend the LAS questions to capture information about organizational reflection practices. Participant Responses were rather non-specific and several participants described not understanding the question. Since the LAS is designed to measure individual-level changes in transformative learning, other tools should have been used to capture organizational reflection practices. Measuring organizational reflection practices appears to be hard given situated knowledge, heterogeneity within organizations, and defining what reflection practice looks like in an organization. As one participant highlighted, an organization cannot reflect, and reflection comes from individuals within the organization.

Finally, we used differing timeframes for assessing reflection frequency (one month at baseline versus "last two weeks" in the follow-up survey). This hindered direct comparisons of reflection frequency between mid-session and follow-up. Given the high frequency of reflection reported at baseline, the two-week follow-up window seemed reasonable to measure a difference. However, I did not account for understandable delays in follow-up survey completion. To enable more robust comparisons in future studies, the follow-up survey question could be modified to ask about reflection frequency "since the end of the workshop" or, better yet, capture reflection practices in 30 days after the workshop to allow for direct comparison to baseline data. Additionally, collecting qualitative data on participants' reflection patterns (e.g., daily, weekly, or sporadic) would provide valuable insights into individual differences in reflection habits. This information was not captured in the current study, limiting the interpretation about changes in reflection practices.

5.5 Discussion

This study offers valuable insights into designing, implementing, and evaluating the impact of critical reflection practices for global health practitioners. The field of global health has recently highlighted the importance of

reflexivity as a critical component for decolonizing the field [99, 117, 120, 160]. This study offers evidence for how interventions can support practitioners to detect the epistemologies and sociopolitical influences on their work and motivate change.

These findings suggest that participants valued individual reflection as a "first step to change," and recommended that individual practices should then connect practitioners to group or organizational activities. Creating opportunities for individuals to connect provides critical scaffolding for collective learning. Indeed, this research offers compelling evidence that group discussions during the workshops specifically helped participants see that their colleagues also questioned their beliefs. Participants expressed a desire for hybrid interventions that pair individual interventions (like *(re)imaginator*) with group activities. Specifically, some participants recommended analog, face-to-face activities. Group conversations can offer an important mechanism to reduce the isolation that participants noted when trying to solve systemic issues, and further empower agents of change within their peers and organizations. Indeed, Bentvelzen et al. note the importance of a "social element" for reflection and that current interventions rarely include this component, highlighting a potential for future tools to support the linkage between individual reflection and collective action. This finding, where participants recognized the importance of connecting their individual reflection to a group, also echoes the *Matrix of Domination* framework underpinning this intervention's design. It showcases the potential utility of this framework in structuring decolonizing interventions to connect individual actions to systemic changes.

This study also offers evidence that the *(re)imaginator* can be a springboard for supporting individual reflection practices. Half of the participants reported that the tool helped them think differently and over 60% of participants committed to learning different ways to act after using the tool. However, at follow-up, none of these trends were sustained. Participants recommended that writing action plans directly after their reflections may help them better articulate how to connect their thinking to action. This feature is echoed in the design for reflection literature where the act of creation enhances reflection [114], and is important for future intervention designs.

Participants also thought that seeing other practitioners' reflections may help them further reflect and take action—echoing Bentvelzen et al. finding that comparison is a critical yet rarely used component of reflection tools [19]. However, with the majority of participants posting their reflections privately, future tools must incorporate better privacy designs. Designers could consider features like posting public reflections at random intervals, which would help with privacy concerns when individuals want to use the tool alongside colleagues (as they did in our workshops). There may also be opportunities for moderators or AI tools to scrub identifiable information (e.g., proper nouns) that may inadvertently disclose a respondent's identity. This is particularly essential to foster personal safety.

This study also highlights a desire for interventions to link reflections to resources that can guide action, like case studies, toolkits, and studies. While the *(re)imaginator* presented a library of resources on the *learn* page, these were not tied to specific questions. This required participants to find the *learn* page and review the entire library for relevant resources. The tool could also do a better job connecting reflectors to the sources of their reflection prompts as an additional resource to guide. Design researchers could extend this work by creating more direct connections between reflection and action. One illustrative example is the Socio-Emotional Health Recommendation System [169] from psychologist Dr. Ellen McGinnis and colleagues [58]. This interactive

dashboard connects users to a catalog of activities to enhance their own wellness that was gathered from 1,000 research participants. The researchers disaggregated their results by goals and demographic traits, so users can easily filter activities by their characteristics. Such a catalog could be paired with individual reflection questions to enhance tailored recommendations.

This research also demonstrates that current organizational cultures deter candor. Participants shared fears of personal harms (e.g., losing projects, promotions, and jobs) if they expressed negative reflections on their personal or organizational work. This makes sense as the global health field does not have a culture of revealing its failures [30, 127]. The funding landscape—where governments, implementing organizations, and academics compete for the same resources—makes transparency and accountability difficult. Sharing failures with funders or in manuscripts can truly ruin careers and organizations. Additionally, the personal ramifications within organizations are real, where promotions may hinge on aligning with the status-quo. This hesitancy to share reflections was also detected in how participants used the tool. Participants posted 81% of their reflections privately, putting them into a repository that was only accessible to our research team. Thus, more research is needed around embedding and sustaining designs that can create psychological safety. Participants recommended that leaders could stoke such environments through their own vulnerability, both by sharing their personal reflections and showing openness to support personal and organizational change. Finally, in terms of how to integrate into practice, participants identified time constraints and competing priorities as significant barriers to their personal reflection practice. They urged organizations to incorporate reflection into regular meetings, emphasizing that this approach is both low-cost and highly desired by practitioners to drive change. This finding aligns with Fleck and Fitzpatrick's research that underscore the importance of time, structure, and encouragement to create a reflective environment [61]. The field of global health can learn from this intervention; instead of waxing poetic about decolonization, this study offers ways for reflection to catalyze organizational change.

This study also offers ideas on how to better design and measure interactive reflection interventions. First, our participants did not enjoy the ludic design of the random question prompt order. Many participants sought a more structured tool that could guide them based on their project stage (e.g., planning, implementation) or allow them to create their own panel of questions. Despite our intentional alignment of roles with the common stages of project implementation (e.g., planning, design, implementation; see Table 4.1.2), participants did not detect this connection. Adding temporal project tags to the reflective prompts library would be helpful and relatively easy, given that the current roles already align with these stages. All of this suggests the importance of designing with flexibility that gives participants various ways to access relevant reflection questions. That said, the element of randomness is worthy of further exploration such that participants can be exposed to different and perhaps more challenging questions, rather than allowing participants to choose their questions. These design ideas may support a stronger connection between reflection and action, particularly if participants are guided to reflection questions deemed more relevant to their projects or personal needs.

Another potential design idea is tagging each reflection prompt with Fleck and Fitzpatrick's *Levels of Reflection [61]*. This approach could be a helpful gauge of user preferences and detecting user preferences around their reflection depth. Given Fleck and Fitzpatrick's strong definitions of the goals of each level, researchers could tag research questions and then use the modified Delphi method for consistency. If validated, this approach may support faster ways to iterate on reflection designs so that practitioners could determine which features or

questions support practitioners to desired stage of critical reflection. Many participants in this study also desired a more structured approach for reflection where questions would guide them towards critical reflection. Using these *Levels of Reflection [61]* offers potential to structure this process, where users could answer questions in a stepwise fashion, moving from the lowest stage of reflection to critical reflection stage for a particular project.

Additionally, the *Learning Activities Survey* and *Technology-Supported Reflection Index* both offer promising tools to measure and compare reflection interventions over time. This study also recommends exploring more granular LAS measurement options and exploring how Likert scales can be presented to ensure validity per Saris et al. [149]. These surveys can provide evidence-hungry global health audiences with ways to detect personal and organizational changes over time. These metrics could be shared externally to showcase their organizational commitment to and action towards decolonization. That said, organizations should be careful of how and why they measure these interventions. Promoting professional safety is critical, and these metrics could lead to unintended consequences (e.g., if a practitioner or team does not take action as quickly as others). Global health still has much to learn about these unintended consequences of metrics [9], as seen in failures of performance-based incentives for example [57, 100, 116, 165].

This study offers evidence on how both designers and global health practitioners can approach integrating reflection into practice. It highlights how participants see the value of reflection and a desire to sustain personal practices, and that they recommended integrating reflection into practice into organizational practices, even if these efforts would be Herculean. Future research should explore the long-term impacts of sustained reflection practices on global health practice, as well as investigate how to tailor these practices effectively across diverse organizational contexts. By embracing critical reflection as a core practice, the field of global health has a mechanism that can stoke change. If the goal is fostering more equitable, effective, and locally responsive interventions, stoking individual change through reflection offers that potential first step to reimagining the field.

6 | Conclusion: shifting power with reflection

> As we inch towards a more equitable future in global health, tensions will always remain with *how* to grapple with the wake. There is **surely nothing bigger than the 'wake' in which global health lives:** the ever-widening gaps between the rich and poor, unbalanced distribution of the devastation of climate change and their undeniable links to our colonial histories. This is often made worse by the weight of the problematic archives to which our work is perpetually anchored. **Perhaps by orienting our work towards transformation that explicitly aligns with the visions of those who live in the wake, we may find our best hope for a pragmatic way forward in the long term**. Pragmatic because it does not assume that this change happens all at once; necessary because always it is turned towards citizens. **Transformative paradigms do not 'call' for decolonisation. They just go about the work of identifying ways to respond to it; by letting go of multiple forms of power held for too long.** Not every project will achieve 'the dream' but if our basic foundations are co-constructed questions built with/by communities, rather than simply a desire to contribute to our archive of evidence—who knows what direction global health could take? **Perhaps that is now where our energies must lie; in the slow steps to build real structures that eventually mean an end to the need for a 'global health' at all.** - Rochelle Burgess [31], emphasis my own

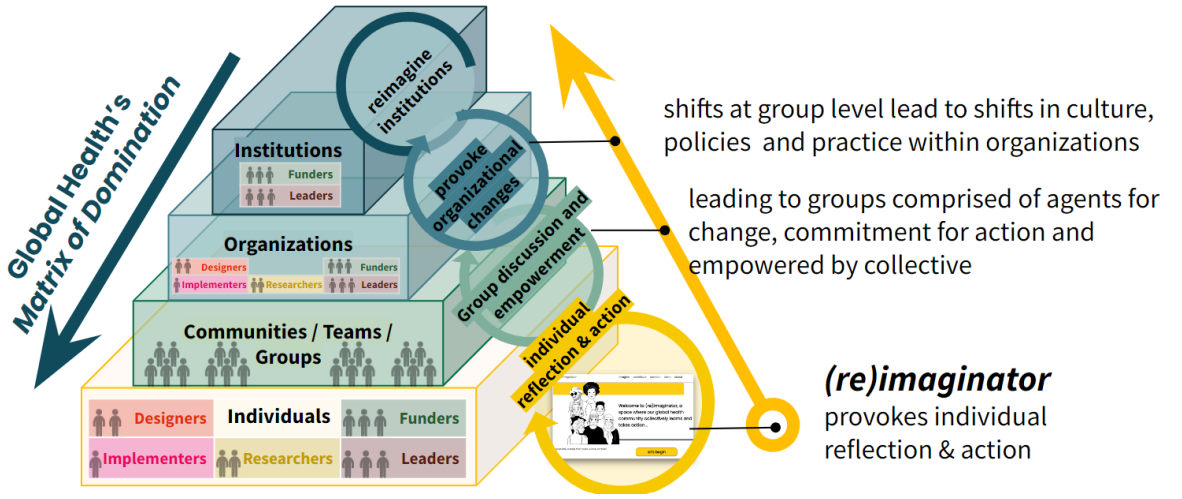
This quote encapsulates the core hypotheses of this dissertation: To what extent can critical reflection guide individual global health practitioners to disrupt the status quo by identifying ways to let go of "power held for too long" and align practices with priorities of marginalized communities? How might interventions be designed to support global health practitioners in this practice of taking "slow steps to build real structures"?

This dissertation argues that critical reflection used in the field of HCI offers global health models and mechanisms for reimagining the field. As global health scholars intensify calls to critically examine the knowledge frameworks and assumptions shaping the field [4, 5, 21, 121], structured reflection interventions can guide practitioners in how to unpack our epistemological stances and examine the sociopolitical motivations of our interventions. Professor Thirusha Naidu describes conducting acts of "epistemic disobedience," where individual practitioners question, interrupt, and revise the knowledge systems prioritized for their global health interventions [120, 121].

This dissertation research leverages theories (Chapter 2) and research (Chapter 3) on the importance of critiquing one's vantage point and design to stoke such reflection. Illuminating our own "situated knowledge," as Feminist Theorists Donna Haraway and Patricia Hill Collins describe, opens the possibility for change [39, 71]. Patricia Hill Collins extended this notion by connecting the importance of individual reflection and action as critical for undoing power structures through her *Matrix of Domination* [39]. Her theory of change underpins the theory and design of the *(re)imaginator* intervention, where I argue that empowering individual practitioners to critique their global health practices is the mechanism for destabilizing and reimagining the field. While we call for decolonization of the field, change is ultimately driven by individuals who propel new approaches and ideas within their teams, departments, and organizations (Figure 6-1). In other words, individual provocation leading to their action can serve as a catalyst for stoking more agents of change within their teams, departments, organizations, and institutions (Figure 6-1). Reflection interventions can be further tailored to common

stakeholder roles within global health (e.g., funders, implementers, researchers) to magnify specific opportunities for critique. I used this framework as the core of this intervention's design. By building the *(re)imaginator* intervention around this theory, I intended to not only reach across stakeholder groups but also attempt to maximize relevance and utility for each of these specific roles within global health's own *Matrix of Domination.*

Figure 6-1. Structuring reflection to action using the Matrix of Domination: Moving from individual-level changes to empowered teams that provoke organizational changes and fundamentally reimagine institutions.



This dissertation research describes how design for reflection scholarship from Human-Computer Interaction (HCI) informed the development of a reflection intervention for global health practitioners (RQ1). I then used this evidence to build a prototype reflection tool called *(re)imaginator* tailored to theory of change in Figure 6-1. Second, it explored how practitioners engaged with and perceived this tool (RQ2), and gauged the extent to which *(re)imaginator* provoked individual practitioners to rethink and reimagine their interventions (RQ3). Here are the key lessons of this research.

RQ1. How can design for reflection scholarship support reflexivity for global health practitioners?

Sub-question

- What is the evidence around how to design for reflection?

Summary of findings

- Design for reflection scholarship was incredibly useful when designing this intervention. There is a wealth of knowledge around what kinds of interventions, digital or otherwise, promote reflection and the specific design features that amplify self reflection.

- In particular, this intervention leveraged ludic design elements recommended by Sengers et al. [154]. This research indicates that these may have contributed to participant's high rating of "enjoyment using the tool." However, global health participants also found the random order of questions, inspired by the Magic 8 Ball toy, to be chaotic rather than playful and recommended a more structured reflection intervention (e.g., specific question order, ability to curate a list of questions, displaying a total count of questions available).
- Fleck and Fitzpatrick's *Levels of Reflection* [61] model and Mezirow's transformative learning steps [88, 111] were useful expansions of Senger et al.'s definition of 'critical reflection' [154] for how reflection can lead to action.
- Ortiz-Lampier's systematic literature review provided an in-depth synthesis and critique of HCI's use and limitation of both qualitative and quantitative tools to measure reflection depth and themes [124].
- Ortiz-Lampier also recommended and adapted the *Learning Activities Survey* for his HCI research to measure Mezirow's stages of reflection for a digital reflection intervention [125]. This served as one backbone for evaluating the extent to which this intervention provoked critical reflection and resulted in action (see RQ3 section below for results).
- Bentvelzen et al.'s literature review describes a catalog of HCI interventions designed to provoke reflection and evaluate their designs [18]. Their synthesis exposed gaps in evaluation methods and led them to create the *Technology-Supported Reflection Inventory* to better compare interactive reflection interventions [19]. This helped us gather feedback from participants on the intervention designs.

Dissertation contributions: This dissertation contributes detailed instructions on how we adapted both the *Learning Activities Survey* (LAS) [88] and *Technology-Supported Reflection Inventory* [19] to measure perspective changes and effectiveness of our reflection intervention *(re)imaginator*. To my knowledge this is the first time a detailed adaptation of these tools has been thoroughly documented, particularly in HCI. This can be used to guide future use and extension of these tools. I advocate in Chapter 5 that the LAS may benefit from a Likert scale to measure smaller changes in transformative learning over time. However, further research is needed to validate the reliability and effectiveness of this scale compared with the existing approach.

I also advocate that adapted LAS and TSRI surveys, like those used in this dissertation, may be useful tools for global health practitioners interested in measuring the impact of any reflection intervention. As global health practice continues to encourage reflection and epistemic justice [4, 5, 21, 121], measuring the connection between changes in thinking and resulting action may generate a body of evidence on what works in decolonizing the field. This kind of methodological extension requires additional validation research, though this evaluation appears worthwhile given our participants' desire for more examples of what has worked for others to change practice. Our field's prioritization of evidence-based interventions could be served by this kind of research; however, a library of anecdotal and contextualized examples would also be useful, according to our participants.

This dissertation also describes (Chapter 4) how we applied evidence from the *design for reflection* literature to build and test an interactive reflection tool for global health. To our knowledge, this is the first intervention of its kind that aims to provoke critical reflection and transformational learning in global health.

RQ2. How do global health practitioners engage with and perceive *(re)imaginator* for critical reflection?

Sub-question

- RQ 2.1. How do global health practitioners describe their baseline personal and organizational reflection practices?
- RQ 2.2. How do participants describe using *(re)imaginator* for reflection?
- RQ 2.3. How do participants engage with *(re)imaginator* for reflection?

Summary of findings

- Study participants reported seeing value in and an appetite for reflecting on their work, but they described their baseline personal reflection practices as ad hoc and informal. This highlights opportunities for more structured reflection tools like *(re)imaginator*.
- Participants indeed recommended more structured tools, as the *(re)imaginator's* random order of questions was deemed chaotic. Participants expected a more structured approach for reflection, with features like creating their own panel of reflection questions or ordering questions into sets that more clearly build on one another.
- 75% of participants agreed that they enjoyed using the *(re)imaginator* tool and 50% somewhat agreed that the tool supported thinking about their work in new ways, highlighting how this specific tool may be appealing to a broad group of stakeholders and promote some changes in thinking
- Notably participants from the implementing and implementing/research organizations, who predominantly originated from low- and middle-income countries, reported the highest enjoyment and changes in thinking from this intervention.
- Participants also noted a desire for reflection tools to include more guidance that linked them to recommendations and resources to guide their individual actions.
- Participants saw the importance of connecting their personal reflections with their colleagues and peers as a critical driver for changing systems. They recommended adding resources, like a companion to support facilitated meetings, that could support dialogues with their colleagues.
- Relatedly, 96% of respondents of the follow-up survey expressed support for integrating reflection into their organization, noting that this is a "low resource" initiative that could impact practice. Yet, only the academic participants described monthly forums to promote reflection. Other participants noted annual and project review meetings as the core way they reflect on their work. Participants did not share any tools that specifically provoked individual or group reflection as part of these processes.
- However, participants also emphasized the need for more psychological safety within their organizations to promote candid reflection given the personal and professional risks of critical reflection. Indeed, even with the *(re)imaginator* tool, participants posted 81% of their reflections privately. They recommended that leadership could stoke such an environment by being open to change and vulnerable in sharing their own reflections.
- One participant highlighted that the speculative design group activity was useful for creating feelings of safety. He thought that the act of describing a distant future where his organization had integrated reflection, and it was "going well" was a useful activity to do with his colleagues. This exercise not only

shifted focus away from individual-level changes and responsibility, but also helped generate mechanisms within the organization to support change.

- Participants recommended funding organizations as the primary group where reflection and resulting changes would have the most substantial impact on changing the field of global health. This aligns with evidence of known power asymmetries outlined in Chapter 1.1, where funding organizations "significantly influence global health priority-setting" [20].
- However, participants from the funding organizations consistently gave *(re)imaginator* the lowest ratings. They noted that integrating reflection tools, or changing any process within their organization, was "Herculean." This highlights opportunities for more research on how to design for reflection with funding organizations to better tailor reflection touchpoints into their practices.

Dissertation contributions

This dissertation found current reflection practices within global health as ad hoc and informal, though study participants report seeing value in reflecting on their work. This indicates opportunities for more structured reflection tools like the *(re)imaginator* to guide individuals in this practice. In fact, to our knowledge, this dissertation presents the first-ever interactive digital intervention designed to support global health practitioners to reflect on their work. It also offers evidence that global health practitioners recommend integrating reflection into organizational practice. They see value in connecting individual practice with group activities, yet this dissertation also highlights the importance of creating more psychological safety within organizations if they want to promote change. Speculative design activities may offer a mechanism for connecting individual reflection to collective action.

This intervention also offers evidence on how to customize reflection for different stakeholder groups within global health (e.g., implementers, researchers, and designers); however, more research is necessary for tailoring reflection tools for funders as *(re)imaginator* did not appear to meet their needs. Notably, participants from implementing and implementing/research organizations, predominantly from low- and middle-income countries, reported the highest levels of enjoyment and changes in thinking. This suggests that the tool may be particularly effective in empowering new thinking from non-Western practitioners and offers a possible mechanism to stoke "epistemic disobedience" [120, 121]. As the field begins to prioritize and legitimize new epistemologies, this dissertation offers compelling evidence for how critical reflection can empower new ways of thinking and action.

RQ3. To what extent does engaging with *(re)imaginator* provoke individual global health practitioners to rethink and reimagine their interventions?

Sub-question

- RQ3.1 What level of perspective transformation do global health practitioners experience directly after using *(re)imaginator*?
- RQ 3.2 How does perspective transformation change over time?
- RQ 3.3 What design features may help global health practitioners critically reflect and embed reflection into practice?

Summary of findings

- Nearly half of participants reported that the tool helped them question the way they act and over 60% committed to adopt new ways of acting. However, these trends were not sustained for the 23 respondents of the follow-up survey.
- This finding may make sense as participants made several design recommendations for how to better connect the individual reflections to action. They suggested that after writing their reflection, the tool tailored resources that could guide future action (e.g., case studies, toolkits, and studies). While the *(re)imaginator* presented a library of resources on the *learn* page, these were not tied to specific questions and this could be a further innovation to support reflection to action. They also recommended writing action plans as a complement to their specific reflections.
- This study demonstrates that group discussions likely contributed to an increase in participants realizing that their colleagues also question their beliefs, hinting at the importance of group discussions

to build organizational change. While this finding is intuitive, the low baseline, as measured with the *Learning Activities Survey*, suggests that practitioners may feel isolated in their beliefs and lack visibility into their colleagues' similar uncertainty around their beliefs. Participants expected and proposed that *(re)imaginator* be connected to more facilitated group activities to enhance transforming reflection into actions and to stoke organizational change.

Dissertation contributions

This study offers evidence on how to use the *Learning Activities Survey* and *Technology-Supported Reflection Index* to measure effects of reflection interventions. It also outlines how these tools could be used with repeated measures to compare whether reflection leads to action over time. This approach may help organizations better measure "decolonization" initiatives, particularly if they are committed to incorporating and empowering epistemological diversity.

This study shows that while *(re)imaginator* supported participants in immediately thinking differently about their work, it did not lead to them taking action during the follow-up window. More research is needed to help practitioners connect their individual reflections to actionable resources, and this study offers several design recommendations for how to better create this linkage. It also offers evidence on how connecting individual reflection to group conversation may help practitioners connect with change-makers within their organization.

Future work

There are many directions that this research could take. Here I will briefly describe several areas for future work within the fields of HCI and global health. Note that specific design recommendations are summarized in Chapter 5.3-4, and the following area offers broader ideas.

Designing to include community members: we note that this critical group of stakeholders (e.g., community members and patients) are not included in this intervention. Future studies could scour academic literature (e.g., from community-based participatory research) to build a bigger library of reflection questions for community members. Participants echoed a desire to gather more feedback from their communities, though one participant aptly noted the power differentials between organizations and these stakeholders and points to need for how to encourage candor while mitigating real risks (e.g., loss of programming, personal repercussions etc.).

Designing to connect individuals to groups: More research is also needed to better understand how to connect individual reflection to groups. This is critical to support the next step in sparking groups of individuals who are committed to taking action (see Figure 6-1). As highlighted in this research, participants see this important linkage between connecting their individual reflections to other practitioners, whether within their organization or beyond. There is a deep desire from the participants in this study to be connected to resources for action, to engage in critique, and to discuss specific ways they can improve their approaches. Importantly, this design must also address the importance of creating a culture of psychological safety as a foundation for candid reflection and change. Participants highlighted how leadership can support these environments through their own vulnerability and candor. Integrating speculative design activities may also offer methods to depersonalize these conversations and work towards shared approaches and ideas for reimagining the field.

Designing for repeated use: Future studies should consider repeated use of a reflection tool, as this would both meet participants' desire for integrating tools into routine practice and support a more in-depth understanding of how the tool can be designed to support reflection over time. Repeated use of the tool may also increase the likelihood of a practitioner taking action based on their reflections. This could be measured through repeated use of the *Learning Activities Survey*, and effectiveness of design changes measured by the *Technology-Supported Reflection Inventory*. Additionally, designers should look to a study just published in Designing Interactive Systems 2024 conference proceedings from James Arnéra and colleagues, whose research highlights how a combination of digital and analog reflection strategies significantly improved participant's "introspective behavior" [13].

Designing with institutions and funding organizations: while we did not have any institutional stakeholders as part of these workshops, the funding organization had the most critical feedback on the *(re)imaginator*. Participants from all other organizations identified funders as the top stakeholder group who should improve their reflection practices to impact global health. More work is needed to understand the unique and complex workflows and processes in large institutions to ascertain how to better design for these audiences.

Explore utility of the tool for other disciplines: The *(re)imaginator* was built on a flexible platform that can easily be duplicated and extended to create tailored reflection practices for other fields. Notably, I have been approached by a designer from a bank who would like to adapt this tool to guide critical reflection practices for their staff, as part of Diversity, Equity, and Inclusion initiatives.

Closing thoughts

As the field of global health grapples with how to decolonize the field, it is important to remember the importance of disrupting "ingrained systems of dominance and power in the work to improve the health of populations" [86]. Decolonization means seeing that global health today is "propelled by a series of projects responding to funding calls, which break the complexity of peoples' daily lives into 'manageable bits', and 'meaningful outcomes'. This simplification means that, after millions of projects and billions of dollars, gains can quickly dissipate" [31]. From my vantage point, this approach fails to build comprehensive health systems. This is echoed in the *Global Health 50/50* report that shows a focus on single diseases rather than health systems and how the priorities identified by Funders do not align with burden of disease [66] (see Figure 1.1-1). If we in global health are working to boost the health and wellbeing of more people, it means building health systems that can prevent and treat co-morbidities in patient-centric ways. Improving the health of populations—to link to Dr. Seye Abimbola's recent work—means recognizing the legacy of 'unfair knowledge practices' [4] within global health and incorporating the 'dignity' of other knowledge systems into practice [5]. This, he argues, is a mechanism for health justice.

Patient- and community-centric health systems ultimately require shifting power from the Global North to leadership in the Global South (e.g., governing bodies, local institutions) who then make decisions about how to allocate funding, set priorities, and implement health programs for their citizens. It also means decentralizing power within countries. By empowering local health systems, countries can better address the unique needs and contexts of heterogeneous communities shaped by intersecting identities (see Section 2.2 for more on 'intersectionality'). Decentralization can foster innovation, empower those with lived experience, and increase

community ownership and participation in health initiatives. Ultimately, decolonization is about ensuring that health systems are responsive to and reflective of the people they serve. This means promoting local knowledge and practices, and ultimately requires current global health practitioners to question the status quo and open to new ideas.

This dissertation offers early evidence for *how* an interactive, self-reflection intervention supports individual global health practitioners in acknowledging their taken-for-granted perspectives. It also offers a theoretical model for how individual changes can serve as a catalyst for reimagining the field by building on Collins' *Matrix of Domination*. Practitioners in this study encouraged reflection as a critical first step for promoting change and ultimately wanted more opportunities to integrate reflection into practice. Said another way, reflection using tools like *(re)imaginator* can offer the field a method for how to identify "unfair knowledge practices" and encourage global health practitioners to reconsider how they build dignity-based practices [5]. While reflection tools may help practitioners to identify their situated knowledge, more efforts are needed to connect reflection to specific actions. Study participants recommended that reflection interventions like *(re)imaginator* directly connect personal reflections to resources and highlight desire for more facilitated conversations with colleagues and peers to exchange ideas.

This research highlights how reflection can support global health practitioners to examine how we each perpetuate systemic violence. I believe that most global health practitioners have exquisite intentions, and yet, we inflict unintentional harm. But that is just it. We have the resources and capacity to move beyond shrugging off our "unintentional consequences" [131]. We can identify our limitations, wrestle with this discomfort, seek opportunities for growth, and build a stronger movement that delivers more culturally brilliant, equitable and impactful health interventions. I believe it is possible to reimagine global health and that individual reimagination practices can catalyze this process of catalyzing better health systems and outcomes.

We recognise that the accountability and reshaping of power dynamics are at the heart of all our proposals for change by ourselves and by organisations. These are not easy, even for people and organisations that are avowedly well intentioned and equity focused. But good intentions are not enough. We are aware that the global health of our dreams and our wish list are unrecognisable from the global health of today. Much will have to change. But change is possible—if we are all willing to deepen our consciousness, listen deeply, listen differently, embrace global solidarity, and fight supremacy in all its forms.

- Seye Ambimbola, et al [2], emphasis my own

Citations

[1] Abebe, V. et al. 2022. Anti-Racist HCI: notes on an emerging critical technical practice. *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2022), 1–12.

[2] Abimbola, S. et al. 2021. Addressing power asymmetries in global health: Imperatives in the wake of the COVID-19 pandemic. *PLoS medicine*. 18, 4 (Apr. 2021), e1003604.

[3] Abimbola, S. 2019. The foreign gaze: authorship in academic global health. *BMJ global health*. 4, 5 (Oct. 2019), e002068.

[4] Abimbola, S. et al. 2024. Unfair knowledge practices in global health: a realist synthesis. *Health policy and planning*. (Apr. 2024). DOI:https://doi.org/10.1093/heapol/czae030.

[5] Abimbola, S. 2023. When dignity meets evidence. *The Lancet*. 401, 10374 (Feb. 2023), 340–341.

[6] Abimbola, S. and Pai, M. 2020. Will global health survive its decolonisation? *The Lancet*. 396, 10263 (Nov. 2020), 1627–1628.

[7] About: *https://interstitial.coop/about*. Accessed: 2024-06-15.

[8] Adams, R.S. et al. 2003. Educating effective engineering designers: the role of reflective practice. *Design Studies*. 24, 3 (May 2003), 275–294.

[9] Adams, V. 2016. *Metrics: What Counts in Global Health*. Duke University Press.

[10] Agre, P.E. 1997. Toward a Critical Technical Practice Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI. *Social Science, Technical Systems, and Cooperative Work: Beyond the Great Divide*. G. Bowker et al., eds.

[11] Algorithmic Justice League - Unmasking AI harms and biases: *https://www.ajl.org/*. Accessed: 2024-06-15.

[12] Alvarado Garcia, A. et al. 2021. Decolonial Pathways: Our Manifesto for a Decolonizing Agenda in HCI Research and Design. *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, May 2021), 1–9.

[13] Arnéra, J. et al. 2024. Digital, Analog, or Hybrid: Comparing Strategies to Support Self-Reflection. *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (New York, NY, USA, Jul. 2024), 3435–3452.

[14] Baumer, E.P.S. 2015. Reflective Informatics: Conceptual Dimensions for Designing Technologies of Reflection. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2015), 585–594.

[15] Baumer, E.P.S. et al. 2014. Reviewing reflection: on the use of reflection in interactive system design. *Proceedings of the 2014 conference on Designing interactive systems* (New York, NY, USA, Jun. 2014), 93–102.

[16] Benjamin, R. 2019. *Race After Technology: Abolitionist Tools for the New Jim Code*. John Wiley & Sons.

[17] Benjamin, R. 2020. Retooling Solidarity, Reimagining Justice. *Race after technology: Abolitionist tools for the new Jim code*. 160–197.

[18] Bentvelzen, M. et al. 2022. Revisiting reflection in HCI. *Proceedings of the ACM on interactive, mobile, wearable and ubiquitous technologies*. 6, 1 (Mar. 2022), 1–27.

[19] Bentvelzen, M. et al. 2021. The Development and Validation of the Technology-Supported Reflection Inventory. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, May 2021), 1–8.

[20] Bermudez, G.F. and Prah, J.J. 2022. Examining power dynamics in global health governance using topic modeling and network analysis of Twitter data. *BMJ open*. 12, 6 (Jun. 2022), e054470.
[21] Bhakuni, H. and Abimbola, S. 2021. Epistemic injustice in academic global health. *The Lancet. Global health*. 9, 10 (Oct. 2021), e1465–e1470.
[22] Bhaumik, S. and Jagnoor, J. 2019. Diversity in the editorial boards of global health journals. *BMJ global health*. 4, 5 (Oct. 2019), e001909.
[23] Bhutta, Z.A. et al. 2023. Adverse childhood experiences and lifelong health. *Nature medicine*. 29, 7 (Jul. 2023), 1639–1648.
[24] Birhane, A. et al. 2021. The Values Encoded in Machine Learning Research. *arXiv [cs.LG]*.
[25] Braun, V. and Clarke, V. 2021. *Thematic Analysis: A Practical Guide*. SAGE.
[26] Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*. 3, 2 (Jan. 2006), 77–101.
[27] Brooke, J. 1996. SUS: a "quick and dirty" usability scale. *Usability evaluation in industry*. 189, 3 (1996), 189–194.
[28] Bump, J.B. and Aniebo, I. 2022. Colonialism, malaria, and the decolonization of global health. *PLOS global public health*. 2, 9 (Sep. 2022), e0000936.
[29] Buolamwini, J. 2023. *Unmasking AI: My Mission to Protect What Is Human in a World of Machines*. Random House Publishing Group.
[30] Burgess, R.A. 2023. *Rethinking Global Health: Frameworks of Power*. Taylor & Francis.
[31] Burgess, R.A. 2022. Working in the wake: transformative global health in an imperfect world. *BMJ global health*. 7, 9 (Sep. 2022). DOI:https://doi.org/10.1136/bmjgh-2022-010520.
[32] Celebrating 20 Years of PEPFAR: 2023. *https://www.state.gov/celebrating-20-years-of-pepfar/*. Accessed: 2024-08-22.
[33] Charani, E. et al. 2022. Funders: The missing link in equitable global health research? *PLOS global public health*. 2, 6 (Jun. 2022), e0000583.
[34] Chaudhuri, M.M. et al. 2021. Decolonising global health: beyond "reformative" roadmaps and towards decolonial thought. *BMJ global health*. 6, 7 (Jul. 2021). DOI:https://doi.org/10.1136/bmjgh-2021-006371.
[35] Cho, J. et al. 2022. Reflection in Theory and Reflection in Practice: An Exploration of the Gaps in Reflection Support among Personal Informatics Apps. *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2022), 1–23.
[36] Chordia, I. et al. 2024. Tuning into the World: Designing Community Safety Technologies to Reduce Dysfunctional Fear of Crime. *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (New York, NY, USA, Jul. 2024), 3097–3116.
[37] Churchill, E.F. ed. *HCI and UX as Translational Research*. Interactions.
[38] Clayphan, A.J. et al. 2017. A student-facing dashboard for supporting sensemaking about the brainstorm process at a multi-surface space. *Proceedings of the 29th Australian Conference on Computer-Human Interaction* (New York, NY, USA, Nov. 2017), 49–58.
[39] Collins, P.H. 1990. Black feminist thought in the matrix of domination. *Black feminist thought: Knowledge, consciousness, and the politics of empowerment*. 138, 1990 (1990), 221–238.
[40] Conn, A.-M. et al. 2020. Adverse Childhood Experience and Social Risk: Pediatric Practice and Potential. *Academic pediatrics*. 20, 5 (Jul. 2020), 573–574.
[41] Costanza-Chock, S. 2020. *Design Justice: Community-led practices to build the worlds we need*.

The MIT Press.
[42] Crenshaw, K. 1989. Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *The University of Chicago legal forum*. (1989), 139.
[43] Dada, S. et al. 2022. Challenging the “old boys club” in academia: Gender and geographic representation in editorial boards of journals publishing in environmental sciences and public health. *PLOS global public health*. 2, 6 (Jun. 2022), e0000541.
[44] Dangerous Delusions: Myth 6: Africa needs our help: 2017. *https://www.globaljustice.org.uk/dangerous-delusions/myth-6-africa-needs-our-help/*.
[45] Davies, R. et al. 2019. Enhancing Reporting of After Action Reviews of Public Health Emergencies to Strengthen Preparedness: A Literature Review and Methodology Appraisal. *Disaster medicine and public health preparedness*. 13, 3 (Jun. 2019), 618–625.
[46] Dearing, J.W. 2021. Diffusion of Innovations. *The Oxford Handbook of Organizational Change and Innovation, 2nd edn*. A.A.H.V. de V. Marshall Scott Poole, ed.
[47] Description of the Reimagining Global Health through Reflexivity Directed Research Group: 2021. *https://www.hcde.washington.edu/research/kolko*. Accessed: 2023-12-26.
[48] Design Justice Network: *https://designjustice.org/*. Accessed: 2024-02-08.
[49] Development Assistance for Health Database 1990-2019: *https://ghdx.healthdata.org/record/ihme-data/development-assistance-health-database-1990-2019*. Accessed: 2024-05-30.
[50] Dinerstein, J. 2006. Technology and Its Discontents: On the Verge of the Posthuman. *American quarterly*. 58, 3 (2006), 569–595.
[51] Discontinuous Change in Organizations and Fields: *https://academic.oup.com/edited-volume/38627/chapter/335264474*. Accessed: 2024-07-27.
[52] Donagh, B. et al. 2023. Sibling Experiences of Adverse Childhood Experiences: A Scoping Review. *Trauma, violence & abuse*. 24, 5 (Dec. 2023), 3513–3527.
[53] Drouhard, M. 2021. *Community Safety Together: How Reflection and Radical Imagination Can Help Us Build the Worlds We Need*. University of Washington.
[54] Dunbar, E. and Kolko, B. 2022. Developing Critical Reflexivity in Global Health. *Designing Interactive Systems Conference* (New York, NY, USA, Jun. 2022), 42–44.
[55] Easterly, W. 2014. *The Tyranny of Experts: Economists, Dictators, and the Forgotten Rights of the Poor*. Basic Books.
[56] Eger, H. et al. 2024. Towards a Feminist Global Health Policy: Power, intersectionality, and transformation. *PLOS global public health*. 4, 3 (Mar. 2024), e0002959.
[57] Eichler, R. and Levine, R. 2009. *Performance Incentives for Global Health: Potential and Pitfalls*. CGD Books.
[58] Ellen McGinnis Profile (creator of the Socio-Emotional Wellness Dashboard): *https://www.linkedin.com/in/ellen-mcginnis-71863846/*. Accessed: 2024-08-22.
[59] Escobar, A. 2018. *Designs for the Pluriverse*. Duke University Press.
[60] Farmer, P. 1999. Pathologies of power: rethinking health and human rights. *American journal of public health*. 89, 10 (Oct. 1999), 1486–1496.
[61] Fleck, R. and Fitzpatrick, G. 2010. Reflecting on reflection: framing a design landscape. *Proceedings of the 22nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction* (New York, NY, USA, Nov. 2010), 216–223.

[62] Friedman, B. and Hendry, D.G. 2019. *Value Sensitive Design: Shaping Technology with Moral Imagination*. MIT Press.
[63] Ghoshal, S. et al. 2020. Toward a Grassroots Culture of Technology Practice. *Proc. ACM Hum.-Comput. Interact.* 4, CSCW1 (May 2020), 1–28.
[64] Gilbertson, A. et al. 2019. Voluntary medical male circumcision for HIV prevention among adolescents in Kenya: Unintended consequences of pursuing service-delivery targets. *PloS one*. 14, 11 (Nov. 2019), e0224548.
[65] Glasgow, R.E. et al. 2021. *Use of the RE-AIM Framework: Translating Research to Practice with Novel Applications and Emerging Directions*. Frontiers Media SA.
[66] Global Health 50/50 2020. *Global Health 50/50 Report: Power, Privilege & Priorities*.
[67] Greenhalgh, T. and Russell, J. 2010. Why do evaluations of eHealth programs fail? An alternative set of guiding principles. *PLoS medicine*. 7, 11 (Nov. 2010), e1000360.
[68] Grocott, L. 2022. *Design for Transformative Learning: A Practical Approach to Memory-Making and Perspective-Shifting*. Routledge.
[69] Hajduk, G.K. et al. 2019. It is not enough that we require data to be shared; we have to make sharing easy, feasible and accessible too! *BMJ global health*. 4, 4 (Jul. 2019), e001550.
[70] Hamid, S.T. 2020. Community defense: Sarah T. Hamid on abolishing carceral technologies. *Logic Magazine*.
[71] Haraway, D. 1988. Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist studies: FS*. 14, 3 (1988), 575–599.
[72] Harrington, C. et al. 2019. Deconstructing Community-Based Collaborative Design: Towards More Equitable Participatory Design Engagements. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW (Nov. 2019), 1–25.
[73] Harrington, C.N. 2020. The forgotten margins: what is community-based participatory health design telling us? *Interactions*. 27, 3 (Apr. 2020), 24–29.
[74] Hedt-Gauthier, B.L. et al. 2019. Stuck in the middle: a systematic review of authorship in collaborative health research in Africa, 2014-2016. *BMJ global health*. 4, 5 (Oct. 2019), e001853.
[75] Heuristic Evaluations: How to Conduct: 2023. *https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/*. Accessed: 2024-02-04.
[76] Hoffman, S.J. and Cole, C.B. 2018. Defining the global health system and systematically mapping its network of actors. *Globalization and health*. 14, 1 (Apr. 2018), 38.
[77] Hsieh, G. et al. 2023. What is in the Cards: Exploring Uses, Patterns, and Trends in Design Cards. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2023), 1–18.
[78] HTTP Archive: Page Weight: 2024. *https://httparchive.org/reports/page-weight*. Accessed: 2024-02-08.
[79] Hussain, M. et al. 2023. Colonization and decolonization of global health: which way forward? *Global health action*. 16, 1 (Dec. 2023), 2186575.
[80] Huy, Q.N. and Vuori, T.O. 2021. Emotionality and Change. *The Oxford Handbook of Organizational Change and Innovation*. M.S. Poole and A.H. Van De Ven, eds.
[81] Institutional Change: *https://academic.oup.com/edited-volume/38627/chapter/335264732*. Accessed: 2024-07-27.
[82] Internet use in 2024: 2024.

https://datareportal.com/reports/digital-2024-deep-dive-the-state-of-internet-adoption.
[83] Issue 52: The Tech Won't Build It Movement Has Spread to Palantir: *https://news.techworkerscoalition.org/2019/08/23/issue-52/*. Accessed: 2024-02-08.
[84] Kaiser Family Foundation 2024. *The U.S. President's Emergency Plan for AIDS Relief (PEPFAR)*.
[85] Kelly, S.E. et al. 2016. Defining Rapid Reviews: A Modified Delphi Consensus Approach. *International journal of technology assessment in health care*. 32, 4 (Jan. 2016), 265–275.
[86] Khan, M. et al. 2021. Decolonising global health in 2021: a roadmap to move from rhetoric to reform. *BMJ global health*. 6, 3 (Mar. 2021). DOI:https://doi.org/10.1136/bmjgh-2021-005604.
[87] Kidder, T. 2009. *Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, a Man Who Would Cure the World*. Random House Publishing Group.
[88] King, K.P. 2009. *The Handbook of the Evolving Research of Transformative Learning Based on the Learning Activities Survey*. IAP, Information Age Pub.
[89] King, N. and Brooks, J. 2017. Doing template analysis: A guide to the main components and procedures. *Template analysis for business*. (2017).
[90] Kristof, N. 2023. Opinion | When George W. Bush Was a Hero -. *The New York Times*.
[91] Krugman, D.W. 2023. Global health and the elite capture of decolonization: On reformism and the possibilities of alternate paths. *PLOS global public health*. 3, 6 (Jun. 2023), e0002103.
[92] Kyobutungi, C. et al. 2023. From vaccine to visa apartheid, how anti-Blackness persists in global health. *PLOS global public health*. 3, 2 (Feb. 2023), e0001663.
[93] Kyobutungi, C. et al. 2021. PLOS Global Public Health, charting a new path towards equity, diversity and inclusion in global health. *PLOS global public health*. 1, 10 (Oct. 2021), e0000038.
[94] Lee, K.S. 2023. Examining Safety and Inclusive Interventions on Dating Apps by Adopting Responsible Social Media Guidelines. *Proceedings of the 2023 ACM Conference on Information Technology for Social Good* (New York, NY, USA, Sep. 2023), 537–546.
[95] Lewis, J.R. 2018. The System Usability Scale: Past, Present, and Future. *International Journal of Human–Computer Interaction*. 34, 7 (Jul. 2018), 577–590.
[96] Lewis, J.R. and Sauro, J. 2009. The Factor Structure of the System Usability Scale. *Human Centered Design* (2009), 94–103.
[97] Liang, C.A. et al. 2021. Embracing Four Tensions in Human-Computer Interaction Research with Marginalized People. *ACM Trans. Comput.-Hum. Interact.* 28, 2 (Apr. 2021), 1–47.
[98] Liukka, M. et al. 2020. Action after Adverse Events in Healthcare: An Integrative Literature Review. *International journal of environmental research and public health*. 17, 13 (Jun. 2020). DOI:https://doi.org/10.3390/ijerph17134717.
[99] Liwanag, H.J. and Rhule, E. 2021. Dialogical reflexivity towards collective action to transform global health. *BMJ global health*. 6, 8 (Aug. 2021). DOI:https://doi.org/10.1136/bmjgh-2021-006825.
[100] Li, X. and Evans, J.M. 2022. Incentivizing performance in health care: a rapid review, typology and qualitative study of unintended consequences. *BMC health services research*. 22, 1 (May 2022), 690.
[101] Loop: Community feedback made easy: *https://app.talktoloop.org/feedback*. Accessed: 2024-02-04.
[102] Lounsbury, M. and Crumley, E.T. 2007. New Practice Creation: An Institutional Perspective on Innovation. *Organization Studies*. 28, 7 (Jul. 2007), 993–1012.
[103] Luseno, W.K. et al. 2021. A review of public health, social and ethical implications of voluntary

medical male circumcision programs for HIV prevention in sub-Saharan Africa. *International journal of impotence research*. 35, 3 (Oct. 2021), 269–278.
[104] Magic 8 Ball: 2023. *https://en.wikipedia.org/w/index.php?title=Magic_8_Ball&oldid=1173116704*.
[105] May, C.R. et al. 2022. Translational framework for implementation evaluation and research: a normalisation process theory coding manual for qualitative research and instrument development. *Implementation Science*.
[106] McGoey, L. 2015. *No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy*. Verso Books.
[107] McKittrick, J.K.A.A. June 6 2020. *We Be Imagining: A Black Waiting (with Katherine McKittrick)*. INCITE.
[108] McNally, B. et al. 2018. Co-designing Mobile Online Safety Applications with Children. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*
[109] McVeigh, K. 2017. World is plundering Africa's wealth of "billions of dollars a year." *The Guardian*. The Guardian.
[110] Means, A.R. et al. 2020. Evaluating and optimizing the consolidated framework for implementation research (CFIR) for use in low- and middle-income countries: a systematic review. *Implementation science: IS*. 15, 1 (Mar. 2020), 17.
[111] Mezirow, J. 1990. *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*. Wiley.
[112] Mezirow, J. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. Wiley.
[113] Mishra, P. and Sandhu, J.S. 2021. Design Is an Essential Medicine. *Global health, science and practice*. 9, Suppl 2 (Nov. 2021), S195–S208.
[114] Mols, I. et al. 2020. Everyday Life Reflection: Exploring Media Interaction with Balance, Cogito & Dott. *Proceedings of the Fourteenth International Conference on Tangible, Embedded, and Embodied Interaction* (New York, NY, USA, Feb. 2020), 67–79.
[115] Mols, I. et al. 2016. Technologies for Everyday Life Reflection: Illustrating a Design Space. *Proceedings of the TEI '16: Tenth International Conference on Tangible, Embedded, and Embodied Interaction* (New York, NY, USA, Feb. 2016), 53–61.
[116] Morgan, L. 2010. Performance incentives in global health: Potential and pitfalls. *Washington, DC: World Bank. https://www. rbfhealth. org/sites/rbf/files/RBF_FEATURE_PerfIncentivesGlobalHealth. pdf*. (2010).
[117] Morton, B. et al. 2022. Consensus statement on measures to promote equitable authorship in the publication of research from international partnerships. *Anaesthesia*. 77, 3 (Mar. 2022), 264–276.
[118] Munn, Z. et al. 2018. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC medical research methodology*. 18, 1 (Nov. 2018), 143.
[119] Nafade, V. et al. 2019. Global health journals need to address equity, diversity and inclusion. *BMJ global health*. 4, 5 (Oct. 2019), e002018.
[120] Naidu, T. et al. 2024. Decolonial framework for applying reflexivity and positionality in global health research. *Global health promotion*. (Apr. 2024), 17579759241238016.
[121] Naidu, T. 2024. Epistemic disobedience–Undoing coloniality in global health research. *PLOS Global Public Health*. 4, 4 (Apr. 2024), e0003033.

[122] Nielsen, J. 1994. *Ten Usability Heuristics for User Interface Design*.
[123] Noor, A.M. 2022. Country ownership in global health. *PLOS Global Public Health*. 2, 2 (Feb. 2022), e0000113.
[124] Ortiz-Lampier, P.J. 2021. *Deeper learning at scale with roleplaying systems*. Massachusetts Institute of Technology.
[125] Ortiz, P. and Harrell, D.F. 2018. Enabling Critical Self-Reflection through Roleplay with Chimeria: Grayscale. *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play* (New York, NY, USA, Oct. 2018), 353–364.
[126] Oti, S.O. and Ncayiyana, J. 2021. Decolonising global health: where are the Southern voices? *BMJ global health*. 6, 7 (Jul. 2021). DOI:https://doi.org/10.1136/bmjgh-2021-006576.
[127] Pai, M. 2019. Archives of Failures in Global Health.
[128] Pai, M. 2023. Can We Walk Our Talk on Decolonizing Global Health?
[129] Parker, G.W. 2020. Best practices for after-action review: turning lessons observed into lessons learned for preparedness policy. *Revue scientifique et technique* . 39, 2 (Aug. 2020), 579–590.
[130] Partners In Health 2017. Postcard from Malawi. (May 2017).
[131] Parvin, N. and Pollock, A. 2020. Unintended by Design: On the Political Uses of "Unintended Consequences." *Engaging Science, Technology, and Society*. 6, 0 (Aug. 2020), 320–327.
[132] Peters, M.D.J. et al. 2021. Scoping reviews: reinforcing and advancing the methodology and application. *Systematic reviews*. 10, 1 (Oct. 2021), 263.
[133] Pierre, J. et al. 2021. Getting Ourselves Together: Data-centered participatory design research & epistemic burden. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery. 1–11.
[134] Ploderer, B. et al. 2014. Social interaction and reflection for behaviour change. *Personal and Ubiquitous Computing*. 18, 7 (Oct. 2014), 1667–1676.
[135] Poole, M.S. and Van de Ven, A.H. 2021. The life cycle process model. *The Oxford Handbook of Organizational Change and Innovation*. Oxford University Press.
[136] Pop-up Accessibility and How to Make Pop-ups More Accessible: *https://blog.usablenet.com/pop-up-accessibility-and-how-to-make-pop-ups-more-accessible*. Accessed: 2024-08-18.
[137] Porter, M.E. and Kramer, M.R. 1999. Philanthropy's New Agenda: Creating Value. *Harvard Business Review*.
[138] Preventing Chronic Disease's Commitment to Diversity, Equity, and Inclusion: 2023. *https://www.cdc.gov/pcd/about_the_journal/pcd_diversity.htm*.
[139] Raj, S. et al. 2019. Clinical Data in Context: Towards Sensemaking Tools for Interpreting Personal Health Data. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* 3, 1 (Mar. 2019), 1–20.
[140] Reed, J.B. et al. 2012. Voluntary medical male circumcision: an HIV prevention priority for PEPFAR. *Journal of acquired immune deficiency syndromes*. 60 Suppl 3, 0 3 (Aug. 2012), S88–95.
[141] Rennie, S. et al. 2020. Ethics of pursuing targets in public health: the case of voluntary medical male circumcision for HIV-prevention programs in Kenya. *Journal of medical ethics*. (Nov. 2020). DOI:https://doi.org/10.1136/medethics-2020-106293.
[142] Reynolds, L. and Sariola, S. 2020. *The Ethics and Politics of Community Engagement in Global Health Research*. Routledge.
[143] Richardson, E.T. 2020. *Epidemic Illusions: On the Coloniality of Global Public Health*. MIT Press.

[144] Rigot, A. 2022. Design From the Margins.
[145] Robinson, J. et al. 2023. Editors as allies: Our two-year experience at PLOS Global Public Health. *PLOS global public health*. 3, 11 (Nov. 2023), e0002644.
[146] Rugged Roads and Flooding Rains — Daily Hurdles to Global Health Delivery: 2019. *https://medium.com/partnersinhealth/rugged-roads-and-flooding-rains-daily-hurdles-to-global-health-delivery-d4e3d83b0859*. Accessed: 2024-06-15.
[147] Safety by Design: *https://www.esafety.gov.au/industry/safety-by-design*.
[148] Saleh, S. et al. 2022. Equity in global health research: A proposal to adopt author reflexivity statements. *PLOS global public health*. 2, 3 (Mar. 2022), e0000160.
[149] Saris, W. et al. 2010. Comparing questions with agree/ disagree response options to questions with item-specific response options. *Survey research methods*. 4, (May 2010), 61–79.
[150] Sayeed, S. and Taylor, L. 2020. Institutionalising global health: a call for ethical reflection. *BMJ global health*. 5, 9 (Sep. 2020). DOI:https://doi.org/10.1136/bmjgh-2020-003353.
[151] Scheuerman, M.K. et al. 2018. Safe Spaces and Safe Places: Unpacking Technology-Mediated Experiences of Safety and Harm with Transgender People. *Proc. ACM Hum.-Comput. Interact.* 2, CSCW (Nov. 2018), 1–27.
[152] Schon, D.A. 1992. *The reflective practitioner: How professionals think in action*. Taylor and Francis.
[153] Searle, M. et al. 2021. Illuminating Transformative Learning/Assessment: Infusing Creativity, Reciprocity, and Care Into Higher Education. *Journal of Transformative Education*. 19, 4 (Oct. 2021), 339–365.
[154] Sengers, P. et al. 2005. Reflective design. *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility* (New York, NY, USA, Aug. 2005), 49–58.
[155] Sengers, P. et al. 2006. Reflective HCI: articulating an agenda for critical practice. *CHI '06 Extended Abstracts on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2006), 1683–1686.
[156] SlidesGo: *https://slidesgo.com/*. Accessed: 2023-10-12.
[157] Slovák, P. et al. 2017. Reflective Practicum: A Framework of Sensitising Concepts to Design for Transformative Reflection. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, May 2017), 2696–2707.
[158] Strode, B. and Morris, A. eds. 2021. *Trust the People*. Stanford Social Innovation Review.
[159] Suchman, L. 2022. Open worlds and the limits of datafication. Youtube.
[160] Taylor, M. et al. 2024. Authorship reflexivity statements: additional considerations. *BMJ global health*. 9, 1 (Jan. 2024). DOI:https://doi.org/10.1136/bmjgh-2023-014743.
[161] The Health Information System Project Management Toolkit: *https://gicsandbox.org/content/products/the-health-information-system-project-management-toolkit*. Accessed: 2024-02-03.
[162] The Luddite: *https://theluddite.org/*. Accessed: 2024-06-15.
[163] Tough, P. 2011. The Poverty Clinic. *The New Yorker*. The New Yorker.
[164] Transforming our world: the 2030 Agenda for Sustainable Development: *https://sdgs.un.org/2030agenda*. Accessed: 2024-06-02.
[165] Turcotte-Tremblay, A.-M. 2020. The unintended consequences of a complex intervention combining performance-based financing with health equity measures in Burkina Faso. (2020).
[166] Turns, J. 1996. An activity framework for fostering reflection in project-based engineering

design classes. *Proceedings of the 1996 international conference on Learning sciences* (Jul. 1996), 316–323.
[167] Turns, J. et al. 2014. Integrating reflection into engineering education. (Jun. 2014). DOI:https://doi.org/10.18260/1-2--20668.
[168] Viergever, R.F. and Hendriks, T.C.C. 2016. The 10 largest public and philanthropic funders of health research in the world: what they fund and how they distribute their funds. *Health research policy and systems / BioMed Central*. 14, (Feb. 2016), 12.
[169] Wellness Dashboard: *https://wellness-practices.vercel.app/*. Accessed: 2024-08-22.
[170] Wiltsey Stirman, S. et al. 2019. The FRAME: an expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation science: IS*. 14, 1 (Jun. 2019), 58.
[171] Winner, L. 1980. Do Artifacts Have Politics? *Daedalus*. 109, 1 (1980), 121–136.
[172] 2024. *Global Health 50/50, Gaining ground? Analysis of the gender-related policies and practices of 201 global organisations active in health*. Cambridge.
[173] 2023. *PEPFAR Guidance: 2023 Country and Regional Operational Plan*. PEPFAR.
[174] *The Tech We Won't Build*.

Appendices

Appendix 1 - Formative research details, tables and templates

This appendix outlines a fuller formative research phase that has been condensed in Chapter 4. All the glorious details are below for the extra curious. We initially wanted to include this as a formal study, hence the formal write-up, but opted to go a different direction.

Pilot Testing with Colleagues from the Digital Initiatives Group

Session overview

For this one-hour session, my goal was to introduce the team to the idea of reflection, including influential theories and papers from HCI, and then have colleagues interact with and react to the reflective prompts. I also aimed to understand how best to "package and disseminate" this information to make it resonate with the global health community.

Figure 3. Image of the slide deck used at the DIGI session

The session began with a presentation introducing the key HCI theories and papers (Figures 3 and 4). First, I described Langdon Winner's "Do Artifacts Have

Politics?" paper to leverage the idea that artifacts (in global health we call them "interventions") "embody specific forms of power" [171]. As described in Chapter 2, Winner's ideas are foundational to this work in that they disrupt the notion of apolitical interventions and open the importance of exploring the worldviews and power structures underlying the design and implementation of artifacts. Next, I introduced Haraway's "Situated Knowledges" paper to highlight the partiality of perspectives to highlight the importance of recognizing the boundaries of personal perspectives [71] (Chapter 2). To situate the framing of the prompts, I shared Collins' scholarship on the *Matrix of Domination* [39] (Chapter 2). I then shared the definitions of reflexivity and positionality from Liang et al. to introduce the idea of critical reflection [97], and shared a screenshot of work from Jennifer Turns that explores a way to apply reflexivity.

Figure 5. Screenshot of the FigJam board annotated with the three sections (1) React to Prompts, (2) Add a prompt, and (3) Feedback and advice

The 11 participants then had 30 minutes to interact with the Figma JamBoard individually. I asked participants to think about their current projects and then read the prompts. I asked them to then react to the prompts by using the Figma JamBoard stickers feature that allows them to "stamp" symbols onto individual questions (Table 2).

Table 2. Table showing the four stamps introduced to participants with the suggested meaning for each symbol

Suggested Definition	Stamp Symbol
Very provocative prompt	
Provocative prompt	
Not a provocative prompt	
Did not understand prompt	

I showed participants how they could add their own ideas for reflexivity prompts in the *(2) add prompts section* of Figure 5. At the end of the session, I asked participants to share their input and feedback and rate the overall idea of this project in the *(3) feedback and advice* section of Figure 5.

Results

Participants reviewed the board marking the individual prompt cards with stamps to note their reactions (Figure 7). All three categories and subcategories of prompts had reactions.

Figure 7. Zoomed in screenshot showing the stamped reactions to the prompts

Of the 55 prompt cards across all categories, 29 cards (53%) had any reaction noted (Table 3). Community-level and Institutional level prompts had the highest *proportion* of reactions though this likely relates to the low number of total prompts in these categories compared with the individual-level prompts. Intervention evaluator roles had the fewest reactions, likely related to the roles of the participants where only a few identify as academic researchers. Given that participants were asked to react to cards related to their projects and work, note that 21 of the 29 cards with reactions had only one reaction. Meaning that 73% of the cards with one reaction had only one person of the 11 participants reacting to it. Participants also added five cards to the board, one new question for each category (Table 3).

Table 3. Summary statistics cards per category and subcategory with any stamp reaction (positive, negative, or a question) along with the number of new cards added

Categories	Total Prompt Cards	Count of Cards with *any* reaction number (%total)	Count of Cards with					Count of cards added by Participants
			4 reactions	3 reactions	2 reactions	1 reaction	0 reactions	
Individual Level Prompts	**45**	**22 (49%)**	**0**	**1**	**3**	**18**	**23**	**3**
Individual	19	13 (68%)	0	1	3	9	6	1
Intervention Designer	14	7 (50%)	0	0	0	7	7	1

Categories	Total Prompt Cards	Count of Cards with *any* reaction number (%total)	Count of Cards with					Count of cards added by Participants
			4 reactions	3 reactions	2 reactions	1 reaction	0 reactions	
Intervention Evaluator	12	2 (17%)	0	0	0	2	10	1
Community level Prompts	**6**	**5 (83%)**	**1**	**0**	**2**	**2**	**1**	**1**
Institutional level Prompts	**4**	**2 (50%)**	**0**	**1**	**0**	**1**	**2**	**1**
Total Count	**55**	**29**	**1**	**2**	**5**	**21**	**26**	**5**
% total	100%	53%	2%	4%	9%	37%	47%	n/a

Participants added two additional reaction stamps (a star and a "+1") that I categorized as positive responses given the colloquial use of these emojis. There were 41 reactions across all three categories of the 55 prompt cards (Table 4), with 98% of the total reactions in positive categories. There were no negative reactions (thumbs down) to any of the prompts and only one question mark on the card with the question "How can art or movement illuminate this area? [107]"

Table 4. Counts of positive, negative and questions reactions disaggregated by categories and subcategories

Categories and specific prompts	Count of Positive Reactions	Count of Negative Reactions	Count of Question Reactions	Total Reactions
Individual Level Prompts	26	0	1	**27**
Individual	*18*	*0*	*0*	***18***
Intervention Designer	*6*	*0*	*1*	***7***
Intervention Evaluator	*2*	*0*	*0*	***2***
Community level Prompts	10	0	0	**10**
Institutional level Prompts	4	0	0	**4**
Total Count	**40**	**0**	**1**	**41**
% total	98%	-	2%	100%

Heuristic Evaluation

Heuristic evaluations are a systematic method for identifying issues with a user interface (UI) design [75]. This method is used early in a technology's design where testers use well defined benchmarks (called Heuristics) to look for and catch major design errors. The current research based its heuristic evaluation on the Nielsen Norman Group's 10 Usability Heuristics for UI Design [122].

The evaluation process was done independently by two researchers (PV and RS). A heuristic evaluation template (Appendix 1) was created that broke down the evaluation by each website screen in the tool. Each page of the screen design was evaluated for each of the usability heuristics individually. Each screen was then given a tag of either "Pass" of "Fail" for that specific heuristic. In case the screen had failed, the evaluator would then assign a

severity rating of “High”, “Medium” or “Low” which would allow the designer to prioritize the issue. Each evaluator gave their recommendations for the issues they deemed necessary to improve the usability and comprehension of the tool. The team then came together to discuss each issue and the rationale behind the rating by each evaluator. These discussions were used to reconcile the instances when the two evaluators had different ratings as they elicited a detailed unpacking of the rationale for the ratings. The final step was determining through these discussions which screens needed to be changed and how. In this research, only those changes were taken into consideration that had either a high severity or common consensus of the problem for the tool.

The heuristic evaluation used the 10 common Nielson heuristics [122] that were applied either to individual pages or to the system as a whole, depending on the nature of the prompt. Using the Nielsen [122] framework, the heuristics were: visibility of system status; match between the system and the real world; user control and freedom; consistency and standards; error prevention; recognition rather than recall; flexibility and efficiency of use; aesthetic and minimalist design; help users recognize, diagnose, and recover from errors; and help and documentation.

The heuristic evaluation entailed 10 evaluation points, and each researcher evaluated these 10 elements independently. Here is a summary of the core design recommendations for key heuristics.

Table 3. All Heuristics Marked Failed

page of the System	**Issue**	**Severity**	**Recommendation**
#1 Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time [122].			
Role	The user is not informed that this is the next step in the process and neither this page had a button like 'Continue' like the previous page	Low	Adding on breadcrumbs to the top that shows the user that this reflection process is a four-step process and on which screen they are on Another quick fix could be writing the “Step Number” on each screen
Success Page	Although this is a 'Success Page' it is not immediately evident that one's responses were posted or not and just presents the user with another question	Medium	There should be a success acknowledgement screen in -between where the users would have the choice to either end the reflection or move on with another question
Contribute	Submit button is white and not apparent	Low	Change the color of submit to yellow
Connection	There is lack of indication for what to expect from this section	Medium / High	Put a description under 'Connection Forum' indicating

	for the users and higher reliance on the intelligence of the user		that these are the responses from others users on the website. Above the filter tabs for the role, there should be a title like 'Filter' to indicate how these buttons can be used.
#2 Match between system and the real world: The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order [122].			
Homepage	"Welcome to (re)imaginator, a space where our global health community collectively learns and takes action..." is not intuitively being read since the users would want to hit 'Continue' to move ahead.	High	Break the prompt and the continue button into two screens with the prompt if followed by the Continue action.
Role	"Choose your role on the project" is not congruent to how some may experience the 'real-world' as there are projects where users will have multiple roles	Medium	Change instruction to "Choose a role on the project you'd like to explore" or "Choose one of your roles on the project"
#3 User control and freedom: Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo [122].			
All	No option to undo or edit response once it has been submitted. No back button.	Medium / High	Add a “Back/Cancel” button. Allow to search and edit responses in the 'Connect' section.
#4 Consistency and Standards: Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions [122].			
All	Lack in consistency in fonts throughout different screens and sections	High	Use the consistent Google Font selected for the system design
#5 Error Prevention: Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action [122].			
All	No option to review response before submitting	Medium / High	Place an interim question of 'this is your response - are you ready to submit?' to have a chance to review responses
#10 Help & Documentation: Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large [122].			

Question	Skip has two options, which is not relevant to the end user	Low	Having a single “Skip” option would help reduce cognitive load

Nielson's heuristic #1 | Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time [122]**.**	
Issue	**Recommendation**
The user is not informed that this is the next step in the process and neither this page had a button like 'Continue' like the previous page	Adding on breadcrumbs to the top that shows the user that this reflection process is a four-step process and on which screen they are on Another quick fix could be writing the “Step Number” on each screen
Although this is a 'Success Page' it is not immediately evident that one's responses were posted or not and just presents the user with another question	There should be a success acknowledgement screen in between where the users would have the choice to either end the reflection or move on with another question
On the ‘Connect’ page There is lack of indication for what to expect from this section for the users and higher reliance on the intelligence of the user	Put a description under 'Connection Forum' indicating that these are the responses from others users on the website. Above the filter tabs for the role, there should be a title like 'Filter' to indicate how these buttons can be used.

Nielson's heuristic #2 | Match between system and the real world: The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order [58].	
Issue	**Recommendation**
Homepage: "Welcome to *(re)imaginator*, a space where our global health community collectively learns and takes action..." is not intuitively being read since the users would want to hit 'Continue' to move ahead.	Break the prompt and the continue button into two screens with the prompt if followed by the Continue action.
Role: "Choose your role on the project" is not congruent to how some may experience the 'real-world' as there are projects where users will have multiple roles	Change instruction to "Choose a role on the project you'd like to explore" or "Choose one of your roles on the project"

Nielson's heuristic #3 | User control and freedom: Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo [58].	
Issue	**Recommendation**
On all pages, No option to undo or edit response once it has been submitted. No back button.	Add a “Back/Cancel” button. Allow to search and edit responses in the 'Connect' section.

Nielson's heuristic # 4 | Consistency and Standards: Users should not have to wonder whether different

words, situations, or actions mean the same thing. Follow platform conventions [122].

Issue	Recommendation
Lack in consistency in fonts throughout different screens and sections	Use the consistent Google Font selected for the system design

Nielson's heuristic #5 | Error Prevention: Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action [122].

Issue	Recommendation
No option to review response before submitting	Place an interim question of 'this is your response - are you ready to submit?' to have a chance to review responses

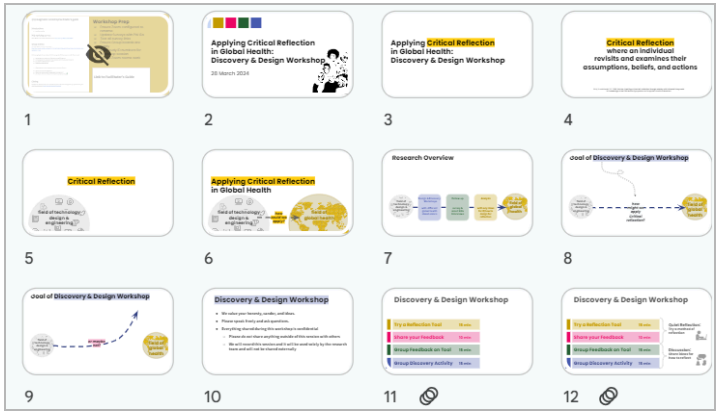
Nielson's heuristic #10 | Help & Documentation: Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large [58].

Issue	Recommendation
On the question page, Skip has two options, which is not relevant to the end user	Having a single “Skip” option would help reduce cognitive load

Appendix 2 - Workshop slides and data collection tools

Workshop slides

(re)imaginator design workshop - slide deck_share



Survey tools

1. Pre-workshop Survey: https://forms.gle/2NgRTbs6aMkiqgGU8
2. Mid-sesion Survey: https://forms.gle/mTRSuX3kXV5MEBH16
3. Follow-up survey: https://forms.gle/cp7RxNxzDpBD16Qm7

System Usability Scale

The System Usability Scale survey is only used in the pilot. Comparison of the original System Usability Scale questions with the slightly-modified questions for this study

System Usability Scale Questions[96]	**Modified Question used in Pilot Workshop**
1. I think that I would like to use this system frequently	*1. I think that I would like to use the (re)imaginator website frequently*
2. I found the system unnecessarily complex	*2. I found the (re)imaginator unnecessarily complex*
3. I thought the system was easy to use	*3. I thought (re)imaginator was easy to use*
4. I think that I would need the support of a technical person to be able to use this system	*4. I think that I would need the support of a technical person to be able to use (re)imaginator*
5. I found the various functions in this system were well integrated	*5. I found the various functions in (re)imaginator were well integrated*
6. I thought there was too much inconsistency in this system	*6. I thought there was too much inconsistency in (re)imaginator*
7. I would imagine that most people would learn to use this system very quickly	*7. I would imagine that most people would learn to use (re)imaginator very quickly*
8. I found the system very cumbersome to use	*8. I found (re)imaginator very cumbersome to use*
9. I felt very confident using the system	*9. I felt very confident using (re)imaginator*
10. I needed to learn a lot of things before I could get going with this system	*10. I needed to learn a lot of things before I could get going with (re)imaginator*

Technology Supported Reflection Index

Table 12. Comparison of the original TSRI questions and the modified questions

Original Dimensions & Questions [19]		**Adapted Questions for Practice Mid-Workshop Survey**	**Questions used in Final Study**
Insight	*Using this system has led to a wake-up call to make changes in my life*	*Using the (re)imaginator website has led to a wake-up call to make changes in my work* | **Rationale for changes:** General update to question to better reflect intervention and intention to reflect on work practices	*1. (re)imaginator led me to think about my work in a new way* | **Rationale for changes:** shortened question
	As a result of using the system, I will change how I approach things	*As a result of using the (re)imaginator website, I will change how I approach things* | **Rationale for changes:** General update to question to better reflect intervention	*2.As a result of using (re)imaginator, I will change how I approach my work* | **Rationale for changes:** shortened question, and further refined to specify work rather than "things"
	Using the system gives me ideas on how to overcome challenges	*Using the (re)imaginator website gives me ideas on how to overcome challenges* | **Rationale for changes:** General update to question to better reflect intervention	*3. Using (re)imaginator gives me ideas on how to overcome challenges* | **Rationale for changes:** shortened question, and further refined to specify work rather than "things"
Exploration	*I enjoy exploring responses with the system*	*I enjoy exploring question prompts with the (re)imaginator website* | **Rationale for changes:** The pilot workshop activity will only ask participants to explore question prompts, and not introduce participants to the *Connect* page of *(re)imaginator* that gives participants an ability to explore responses	*4. I enjoy exploring question prompts with (re)imaginator* | **Rationale for changes:** shortened question
	The system makes it easy to get an overview of my personal data	*The (re)imaginator website makes it easy to see a variety of question prompts* **Rationale for changes:** *(re)imaginator* currently lacks a feature to export a user's individual data; instead, participants will receive instructions to copy and paste their reflections. Question was modified to reflect the scope of the pilot workshop activity for participants to explore a variety of question prompts.	*5. (re)imaginator makes it easy to see a variety of question prompts* | **Rationale for changes:** shortened question

Original Dimensions & Questions [19]		**Adapted Questions for Practice Mid-Workshop Survey**	**Questions used in Final Study**
	The system makes it easy to review my long-term personal data	*The (re)imaginator website makes it easy to review responses.* | **Rationale for changes:** (re)imaginator is not designed to review long-term data but has features to review other responses on the *Connect* page. However, since the workshop activity will not introduce participants to the Connect page, we expect a negative response for this question.	*6. (re)imaginator makes it easy to review responses* | **Rationale for changes:** shortened question
Comparison	*I reflect on my data in the system with others*	*I compare my responses with other responses* | **Rationale for changes:** updated question to replace "data" with responses given data input into *(re)imaginator*. However, since the workshop activity will not introduce participants to the Connect page, we expect a negative response for this question.	*7. (re)imaginator allows me to compare my responses with other responses* | **Rationale for changes:** updated to better reflect the activity and measure whether system allows rather than whether the user actually compares.
	The system helps me to discuss my data with others	*The (re)imaginator website encourages me to discuss my responses with colleagues* | **Rationale for changes:** the system is not designed to "help" the discussion, so updated the question to "encourages me."However, since the workshop activity will not introduce participants to the Connect page, we expect a negative response for this question.	8. *(re)imaginator encourages me to discuss my responses with colleagues* | **Rationale for changes:** shortened question
	I reflect on my responses in the system with other responses	*As a result of using the (re)imaginator website, I will discuss my experience with project or organizational leadership*	9. *As a result of using (re)imaginator, I will discuss my experience with my leadership*
			As a result of using (re)imaginator, I will discuss my experience with my professional peers

Learning Activities Survey

Comparison of Ortiz-Lampier and Harrell's Learning Activities Survey questions to the modified questions

Learning Activities Survey from King's original survey [88]	**Connection to Mezirow's Learning Stages** from King's original survey [88]	**Adapted questions** from Ortiz-Lampier and Harrell application in HCI research[125]	**Survey Questions used in this dissertation research**					
			Pre-workshop Survey Questions	**Mid-Workshop Survey Questions**	**Follow-up Survey Questions**	**Response** Choose one		
Thinking about your educational experiences at this institution, check off any statements that may apply	*n/a*	*n/a*	n/a	*Thinking about your experience using (re)imaginator to reflect on your projects, check off any statements that apply:*	*Thinking about the last two weeks since our workshop, check off any statements that apply:*	n/a		
a. I had an experience that caused me to question the way I normally act	*Measures Stage 1: Disorienting dilemma*	*This experience caused me to question the way I normally act*	Not included	This experience caused me to question the way I normally act	Using (re)imaginator caused me to question the way I normally act	Yes	No	Unk
B. I had an experience that caused me to question my ideas about social roles	*Measures Stage 1: Disorienting dilemma*	*This experience caused me to question my ideas about social roles*	Not included	*This experience caused me to question my ideas about global health professional roles*	*Using (re)imaginator caused me to question my ideas about global health professional roles*	Yes	No	Unk
C. As I questioned my ideas, I realized I no longer agree with my previous believes or role expectations	*Measures Stage 2: Self examination*	*While reflecting on this experience, I realized that I no longer agree with my previous beliefs or role expectations*	Not included	As I used (re)imaginator, I realized that I no longer agree with my previous beliefs or role expectations	I realized that I no longer agree with my previous beliefs or role expectations	Yes	No	Unk
D. Or instead, as I questioned my ideas, I realized that I still agree with my beliefs or role expectations	*Measures Stage 2: Self examination*	*While reflecting on this experience, I realized that I still agree with my previous beliefs or expectations*	Not included	*As I used (re)imaginator, I realized that I still agree with my beliefs or role expectations*	*I realized that I still agree with my beliefs or role expectations*	Yes	No	Unk
G. I felt uncomfortable with traditional social expectations	*Measures Stage 3: a critical assessment of epistemic,*	*Not included*	Not included	I felt uncomfortable with traditional professional expectations	In the past two weeks, I felt uncomfortable with traditional professional			

Learning Activities Survey from King's original survey [88]	**Connection to Mezirow's Learning Stages** from King's original survey [88]	**Adapted questions** from Ortiz-Lampier and Harrell application in HCI research[125]	**Survey Questions used in this dissertation research**					
			Pre-workshop Survey Questions	**Mid-Workshop Survey Questions**	**Follow-up Survey Questions**	**Response** Choose one		
	socio-cultural or psychic assumptions				expectations			
E. I realized that other people also questioned their beliefs	*Measures Stage 4: recognition that one's discontent and the process of transformation are shared & that others have negotiated a similar change*	*Not used*	Not included	As I used (re)imaginator, I realized that other people also question their beliefs	I realized that other people also questioned their beliefs	Yes	No	Unk
F. I thought about acting in a different way from my usual beliefs	*Measures Stage 5: exploration of options for new roles, relationships and actions*	*While reflecting on this experience, I thought about acting in a different way from my usual beliefs or roles*	Not included	As I used (re)imaginator, I thought about acting in a different way from my usual beliefs or roles	In the past two weeks, I have thought about acting in a different way from my usual beliefs or roles	Yes	No	Unk
I. I tried to figure out a way to adopt these new ways of acting	*Measures Stage 6 planning a course of action*	*Not included*	Not included	I **will** gather information to try to adopt new ways of acting	In the past two weeks, I **have tried** to figure out a way to adopt new ways of acting	Yes	No	Unk
J. I gathered the information I needed to adopt these new ways of acting	*Measures stage 7: Acquisition of knowledge and skills for implementing one's plans*	*Not included*	Not included	I **will** gather the information I need to adopt new ways of acting	In the past two weeks, I **have** gathered the information I needed to adopt these new ways of acting	Yes	No	Unk
H. I tried out new roles so that I would become more comfortable or confident in them	*Measures Stage 8: provisional trying of new roles*	*Not included*	Not included	Question not included	In the past two weeks, I have tried out new roles so that I would become	Yes	No	Unk

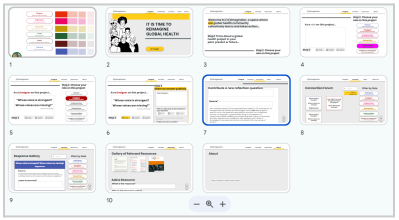
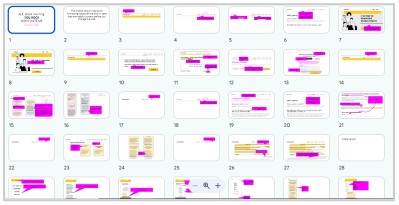
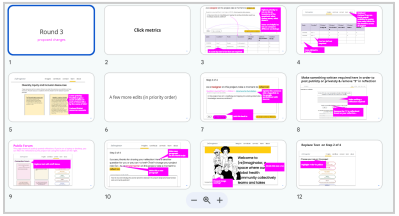
Learning Activities Survey from King's original survey [88]	**Connection to Mezirow's Learning Stages** from King's original survey [88]	**Adapted questions** from Ortiz-Lampier and Harrell application in HCI research[125]	**Survey Questions used in this dissertation research**					
			Pre-workshop Survey Questions	**Mid-Workshop Survey Questions**	**Follow-up Survey Questions**	**Response** Choose one		
					more comfortable or confident in them			
K. I began to think about the reactions and feedback from my new behavior	*Measures Stage 9: building of competence and self confidence in new roles and relationships*	*Not included*	Not included	I began to think about the reactions from colleagues if I adopt new ways of acting	In the past two weeks, I have thought about the reactions and feedback from my new behavior	Yes	No	Unk
L. I took action and adopted these new ways of acting.	*Measures Stage 10: a reintegration into one's life on the basis of conditions dictated by one's new perspectives*	*Not included*	Not included	I **will** take action and adopt these new ways of acting.	In the past two weeks, I **have** taken action and adopted new ways of acting.	Yes	No	Unk
M. I do not identify with any of the statements above	*n/a*	*Not included*	Not included	Not applicable / if all no then this is answered	Not applicable / if all no then this is answered	n/a		
Since you have been taking courses at this institution, do you believe you have experienced a time when you realized that your values, beliefs, opinions or expectations had changed?	*n/a*	*Not included*	Not included	Based on your experience using (re)imagator, did you realize that your global health values, beliefs, opinions or expectations have changed?	In the past two weeks, have you realized that your global health values, beliefs, opinions or expectations have changed?	Yes	No	Unk
Briefly describe what happened.	*n/a*	*Not included*	Not included	Briefly describe your answer above.	Briefly describe your answer above. Why or why not?	Short Answer		

Learning Activities Survey from King's original survey [88]	**Connection to Mezirow's Learning Stages** from King's original survey [88]	**Adapted questions** from Ortiz-Lampier and Harrell application in HCI research[125]	**Survey Questions used in this dissertation research**					
			Pre-workshop Survey Questions	**Mid-Workshop Survey Questions**	**Follow-up Survey Questions**	**Response** Choose one		
Thinking back to when you first realized that your views or perspectives had changed, what did your being in school have to do with the experience of change.	*n/a*	*Not included*	Not included	What (if anything) did using (re)imaginator have to do with the experience of your views or perspectives changing?	Thinking back to when you realized that your views or perspectives have changed, what (if anything) did your use of (re)imaginator have to do with the experience of change? **Why or why not?**	Short Answer		
Would you characterize yourself as one who usually thinks back over previous decisions or past behaviors?	*n/a*	*Not included*	Would you characterize yourself as one who usually thinks back over previous decisions or past behaviors?	Not included	Would **you** characterize yourself as one who usually thinks back over previous decisions or past behaviors?	Yes	No	Unk
Would you say that you frequently reflect upon the meaning of your studies for yourself, personally?	*n/a*	*Not included*	Would you say that you frequently reflect on your global health work for yourself, personally?	Not included	Would you say that you frequently reflect on your global health work for yourself, personally?	Yes	No	Unk
			Based on your answer above, in a few sentences describe your experience with reflection on or processes for reflecting on your global health work.	Not included	Based on your answer above, in a few sentences describe your experience with reflection on or processes for reflecting on your global health work.	Short Answer		
			Would you say that your **organization** frequently reflects on its global health work?	Not included	Would you say that your **organization** frequently reflects on its global health work?	Yes	No	Unk

Learning Activities Survey from King's original survey [88]	**Connection to Mezirow's Learning Stages** from King's original survey [88]	**Adapted questions** from Ortiz-Lampier and Harrell application in HCI research[125]	**Survey Questions used in this dissertation research**			
			Pre-workshop Survey Questions	**Mid-Workshop Survey Questions**	**Follow-up Survey Questions**	**Response** Choose one
			Based on your answer above, in a few sentences describe your **organization's** reflection processes	Not included	Based on your answer above, in a few sentences describe your **organization's** reflection processes	Short Answer

Appendix 3 - Summary of design changes

The following design update files were shared with the developer:

File - Date	Summary of Changes	Screenshot & Link
Website Mock-up **22 October 2023** **Link:** **20231022_Website Moc…**	• Modified original designs presented in my proposal defense mock-ups.	
Round 1 of Revisions **02 December 2023** **Link:** **20231202_reimaginator…**	Significant user experience edits, including: • Breaking up the *Imagine* flow into several screens for clarity • Update to the navigation, including adding a new page for "contributing" and changing the menu titles to verbs • Updates to all pages, including some layout issues detected on both website and mobile device review	
Round 2 of Revisions **16 January 2024** **Link:** **20240116_reimaginator…**	Final round of edits based on the Heuristic Evaluation and the Pilot Workshop and addressing some of the missing updates from the 27 December requests	

Appendix 4 - Full results from Chapter 5

Table 1. Demographic Characteristics of Pilot Workshop Participants

Parameter	Category	Number	% Total n = *30*
Organization Type	Implementer	8	26.7%
	Implementer - Research	7	30.0%
	Academic	7	23.3%
	Funder	6	20.0%
Age Category	25-34	8	26.7%
	35-44	13	43.3%
	45-54	6	20.0%
	55-64	3	10.0%
Gender Identity	Man	13	43.3%
	Woman	16	53.3%
	Non-binary/non-conforming	1	3.3%
Country of Origin	Benin	1	3.3%
	Brazil	1	3.3%
	Burundi	1	3.3%
	Canada	1	3.3%
	India	1	3.3%
	Kenya	2	6.7%
	Madagascar	2	6.7%
	Malawi	1	3.3%
	Spain	1	3.3%
	Tanzania	3	10.0%
	USA	13	43.3%
	Multiple Countries	3	10.0%
	Just starting my career	3	10.0%

Parameter	Category	Number	% Total n = *30*
Global Health Job Level	(less than 2 years working in global health)		
	Early career (e.g. Program Assistant / Assistant Professor)	6	20.0%
	Mid-Level (e.g. Program Manager / Associate Professor)	9	30.0%
	Senior (e.g. Program Director / Senior Manager / Professor)	8	26.7%
	Executive (e.g. Executive team / Institute Director / Department Chair)	3	10.0%
	Other "Doing my internship"	1	3.3%
Highest Educational Degree	Bachelors	1	3.3%
	Masters	13	43.3%
	JD	1	3.3%
	PhD	13	43.3%
	MD	1	3.3%
	MD, PhD	1	3.3%

Organization Type	Job Title	Number	% Total n = *30*
Implementing Organization	Director	6.0	20.0%
	Clinician	2.0	6.7%
	Clinical Mentor	1.0	3.3%
Implementing Organization Research Team	Senior Researcher	1.0	3.3%
	Researcher Manager	1.0	3.3%
	Research Associate	3.0	10.0%
Academic Institution	Academic Program Chair	1	3.3%
	Professor	1.0	3.3%
	Assistant Professor	3.0	10.0%
	Associate Professor	2.0	6.7%
Funding Organization	Senior Manager	1.0	3.3%
	Senior Officer	7.0	23.3%

	Program Assistant	1.0	3.3%

RQ 2.1 | How do global health practitioners describe their baseline personal and organizational reflection practices?

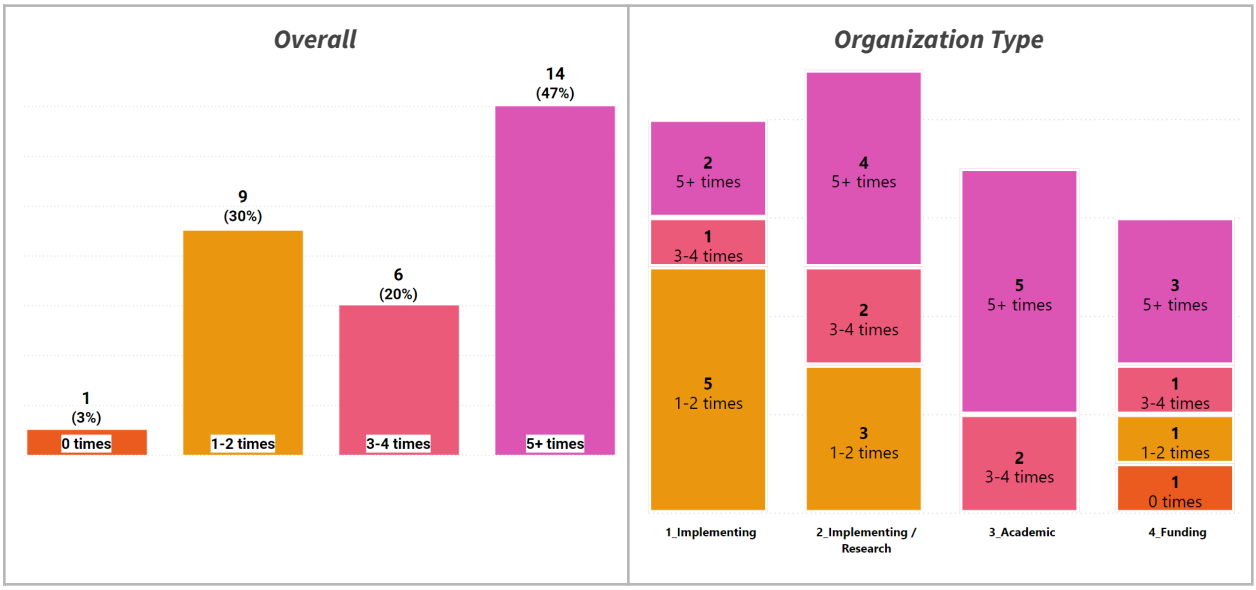
After consenting to participate in the study, participants were asked to complete a short, pre-workshop survey.

Baseline Personal Reflection Practices

Among the 30 workshop participants, 27 (90%) reported engaging in reflective thinking about their past decisions and behaviors at baseline. Of these, 67% (n=20) of participants reported that they reflect on their global health work three or more times in the month prior to the workshop (Figure RQ2.2-1).

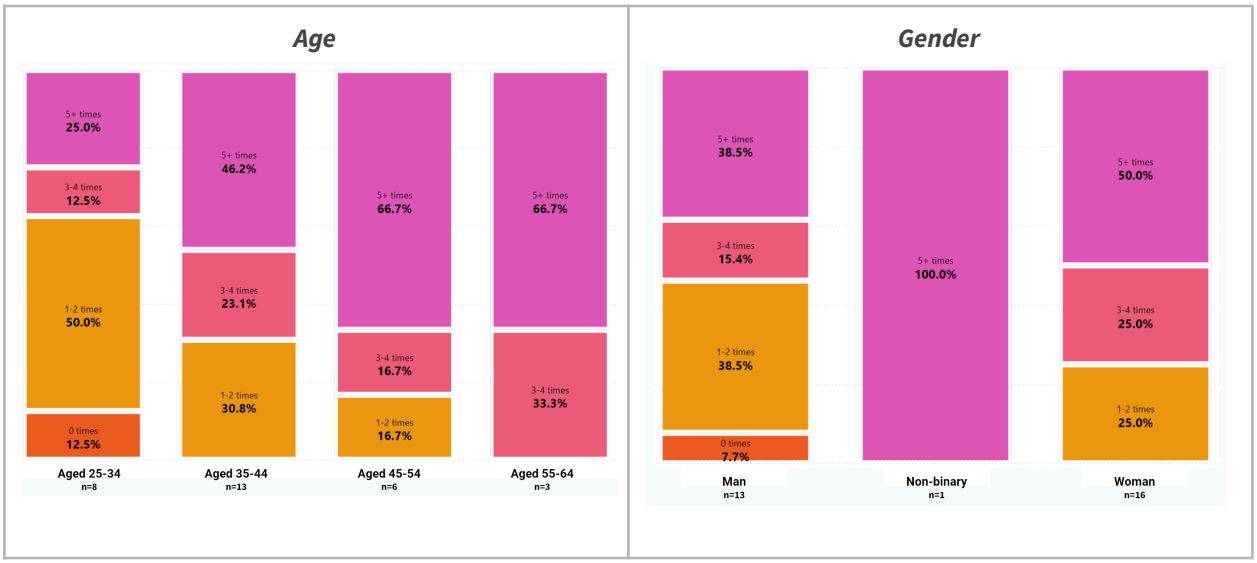
For the data disaggregated by demographic characteristics, it is important to note the small sample sizes affect interpretation and are considered as trends in this data, not generalizable findings. In terms of organization types, participants from the implementing organization reported the lowest frequency of reflection, with 63% (n=5) reporting that they reflected 1-2 times a month. Academics had the highest frequency reflecting on their work over five times a month at 71% (Figure RQ2.1-1). Participants describe reflection as an integral part of their work, taking place during meetings, independent thinking, and while preparing for discussions or presentations. Participants shared that their reflections are mostly context-dependent and tailored to the specific situations, projects, and decisions at hand.

Figure RQ2.1-1. Frequency of personal reflection on global health work in the past month, overall and by organization type



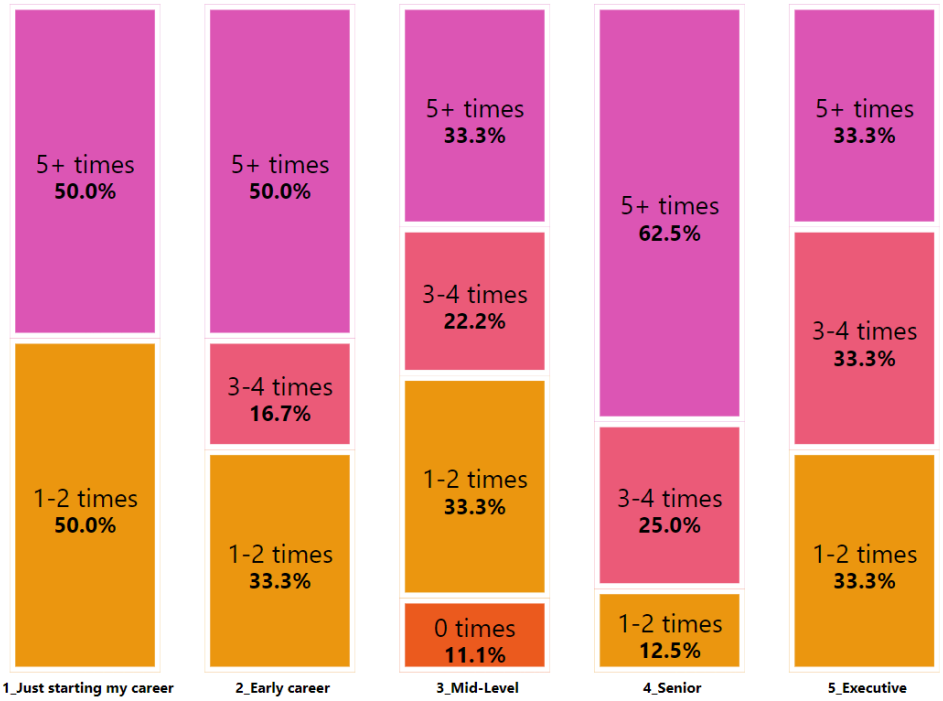
There was a clearer trend in reflection frequency by age (Figure RQ2.1-2), with 89% (8 of 9 participants) of global health practitioners aged 45 and above reflecting more than three times a month, compared with 57% of participants aged 25 to 44 (12 of 21 participants). In terms of gender 54% of men (7 of 13) reflected at least 3 times a month, compared with 67% of women (20 of 30 participants) and 100% of non-binary participants (1 participant) (Figure RQ2.1-2).

Figure RQ2.1-2. Frequency of reflection on global health work in the past month by age and gender

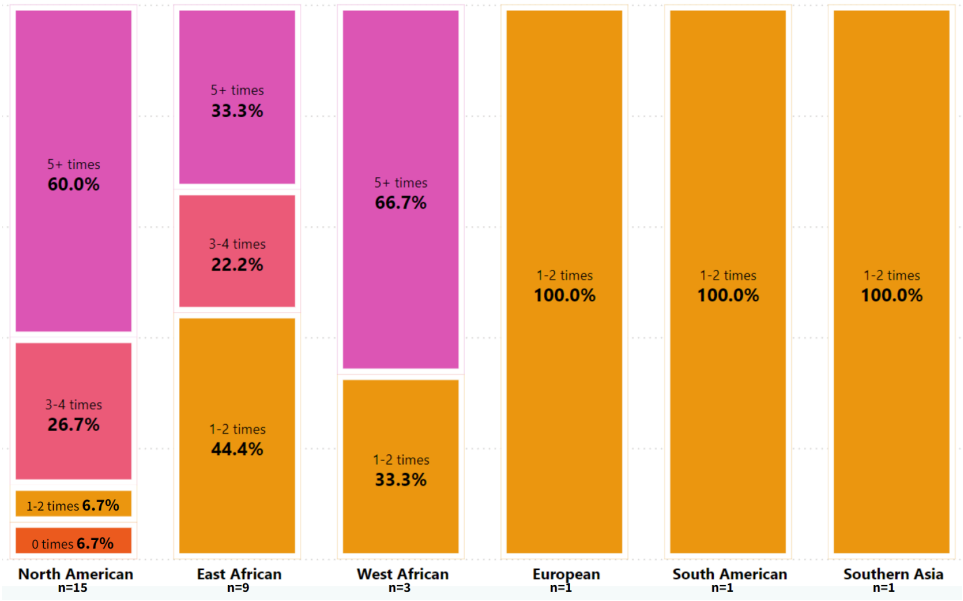


There were no obvious trends in the frequency of reflection by job level (comparing junior and senior-level staff) (Figure RQ2.1-3). However, in terms of origin region, 87% of North American participants reported reflecting at least 3 times per month, which was the highest frequency reported among the study participants (Figure RQ2.1-4).

Figure RQ2.1-3. Frequency of reflection on global health work in the past month, by career level



FigureRQ2.1-4. Frequency of reflection on global health work in the past month, by region of origin



Reflection Topics and Themes

The pre-workshop survey revealed common themes in their reasons for reflecting. However, due to small sample sizes within each specific category, all responses were analyzed together as a group to protect confidentiality. Quotes contain only high-level descriptive information to maintain confidentiality of participants.

Reflecting on projects: The most common theme was reflecting on current or past projects, with emphasis on the impact of their work and lessons learned that may guide future projects. Participants emphasized reflecting on the effects that their interventions have on local stakeholders, trainees, and the communities they serve. As a mid-career-level male from East Africa described, "I always remember different projects…that we implemented in the past 3 years, how it would be if we were the one continuing implementing it. I see from the field that the project is not faring well." Many expressed a desire to adapt their projects to meet evolving population needs, legislative changes, and scientific advancements, as they reflected on the future of global health.

Career Trajectory: Many participants described reflection as important for shaping their global health career trajectory. Particularly, participants from East and West Africa highlighted the role of self-reflection in annual performance reviews where they documented accomplishments, goals and planned for career advancements. Additionally several participants reflected on their organization's future and whether they were the best fit for their role. As one North American, mid-career-level female described:

> My role… requires thinking about the future of the team and growing our work. Part of that is considering my role-- am I the best person? Is there someone who has additional skills that could be in this role and on what timeline?-- and also how we grow the team overall to meet the changing needs of the organization.

Power Dynamics and Positionality:

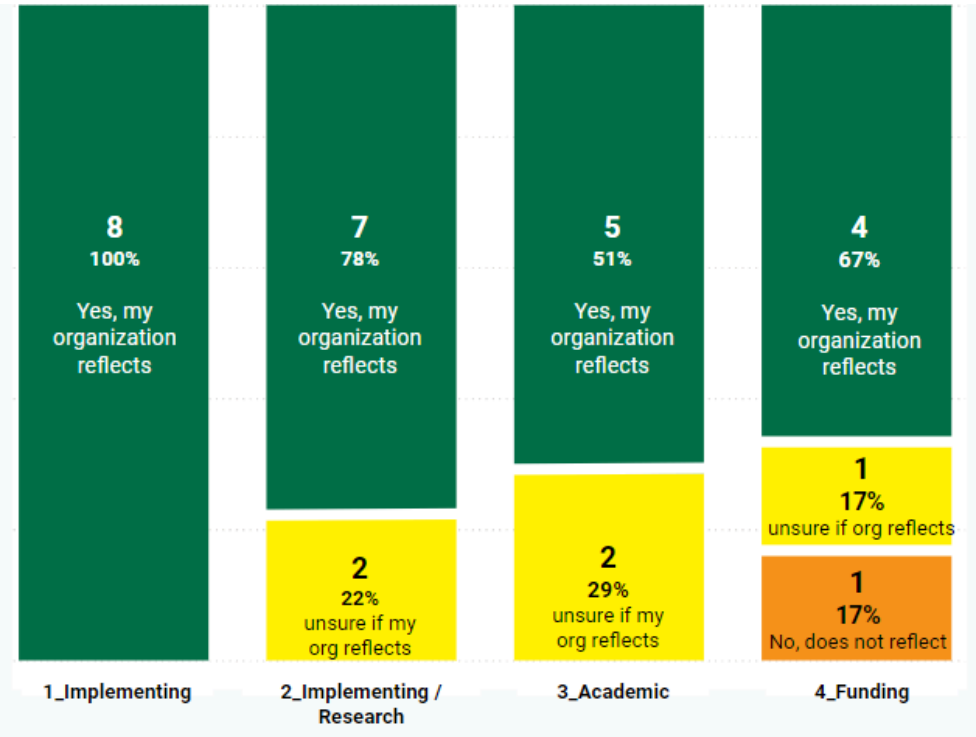
Participants reflected on their positionality and how their identities influenced their work and decisions. They considered their positions of power, with a focus on shifting power to local stakeholders. This was particularly noted by three North Americans. Several also considered historical and ethical considerations of their work, noting the importance of considering who holds the power and sets priorities in their international collaborations. As one senior-level, woman described:

> As grantees of US government funds to implement projects internationally, our institution becomes part of representing the priorities of the US government with the countries we work with. It is important to reflect on how we engage and what we represent to these foreign government and institutions as we work together and establish partnerships. Reflecting on the historical and present power dynamics between the countries as well as the dynamics of how global health work is implemented, helps us better understand the different actors and stakeholders involved in our work, leading to a more balanced decision making in which different perspectives are taken into account.

Baseline Organizational Reflection Practices

Eighty percent of participants (24 of 30) categorize their organization as “one that reflects on its global health work” (Figure RQ2.1-5). Participants describe organizational reflection practices as occurring during quarterly, annual, or 5-year strategic planning where they review work plans, achievements, challenges and ensure alignment with organizational strategy. Of the (20%) participants who reported they were unsure or their organization did not reflect, half shared that they were unaware of any formal mechanisms and two noted that they believed their organization did not learn from past mistakes.

Figure RQ2.1-5. Participant Responses on whether their organization reflects, disaggregated by organization type (n=30)



In terms of organizational differences, several implementers mentioned reviewing their work at project closeout and "informally as part of project planning." Academics reported more formal groups to promote organizational reflection, noting the existence of both a social justice working group and a partner advisory council to discuss research partner relationships. Though notably one academic still noted they were not sure their organization learned from past mistakes. Another who marked "unsure" pointed out "I don't know if an organization can consider or analyze - maybe the people in the org can, and if we do it together, then the [organization] is? So maybe I'm a 'yes'." One participant from the implementing/research organization also marked "unsure" as they did not understand the question, highlighting the need for more research.

Participants from the funding organization mentioned review during the "grant-making process" with emphasis on "selecting more proximal partners to lead work." However one senior-level participant noted that the "organization doesn't have strong mechanisms for learning from mistakes," while another mid-level-career participant noted they were unsure if there was any systematic organizational reflection.

RQ 2.2 | How do participants engage with and perceive *(re)imaginator* for reflection?

This section explores how participants interacted with and perceived the *(re)imaginator* tool. Facilitators guided participants through the tool's *imagine* section, providing step-by-step instructions for the activity. Participants

then had 15 minutes to engage with the reflection tool. At the end of the 15 minutes, the facilitators shared the mid-session survey link, where each individual shared their feedback on their experience and perceptions.

Engaging with *(re)imaginator*

Role Selections

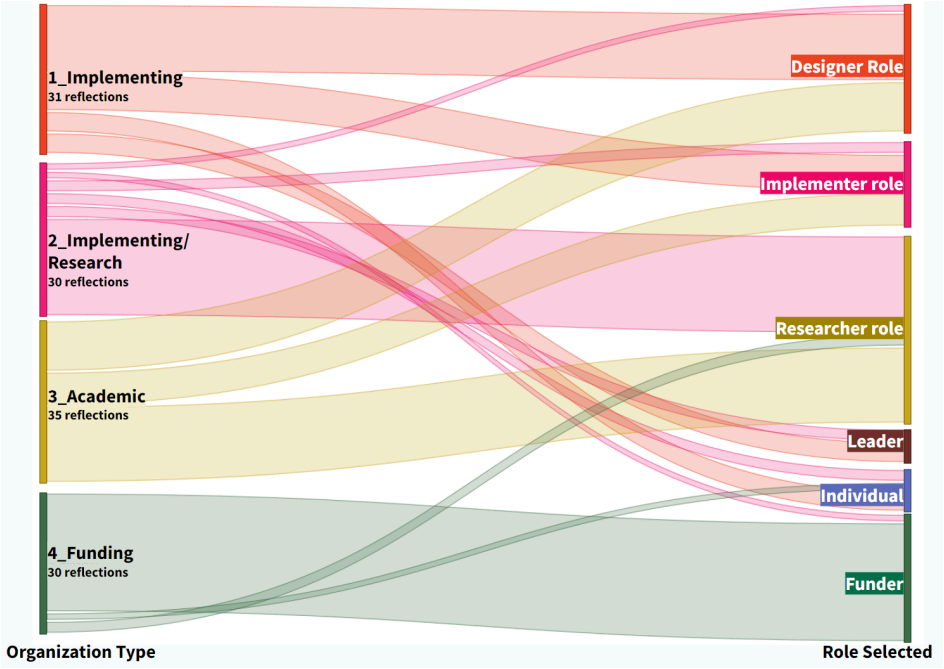
In our 4 workshops, 30 participants completed 126 reflections, answering an average of 4.2 questions per person in 15 minutes. Notably, the participants' role selections aligned well with their organization types (Table RQ2.2-1). In other words, these workshops engaged a cross-section of global health stakeholders representing their organizational category (e.g. implementing organization, funding organization) nicely. Table RQ2.2-1. Count of responses shown by the roles participants selected by organization type, the shaded boxes show the highest counts per organization.

Table RQ2.2-1. Alignment of organizational type with the roles selected for each reflection question answered along with the total questions and average number answered

	Role selected in *(re)imaginator*							
Organization Type	**Designer**	**Implementer**	**Researcher**	**Individual**	**Funder**	**Leader**	**Total Qs**	**Avg Qs**
1_Implementing org	**15**	**8**	**-**	**4**	**-**	**4**	**31**	**3.9**
2_ Research Team of Implementing Org	**1**	**2**	**22**	**2**	**1**	**2**	**30**	**3.3**
3_Academic	**11**	**7**	**17**	**-**	**-**	**-**	**35**	**5.0**
4_Funding	**-**	**-**	**2**	**1**	**27**	**-**	**30**	**5.0**
Total	**27**	**17**	**41**	**7**	**28**	**6**	**126**	**4.2**
%	*21.4%*	*13.5%*	*32.5%*	*5.6%*	*22.2%*	*4.8%*	*100%*	

This alignment between organization type and participant role selection is also clear in the Sankey diagram (Figure RQ2.2-1). This diagram displays each response in the *(re)imaginator* tagged by the participant's and the role of the question they answered. Participants from the implementing organization mostly selected questions tailored to intervention designers and implementers, whereas participants from the philanthropic organization answered questions designed for funders. The qualitative findings around this role selection are found at the end of this section.

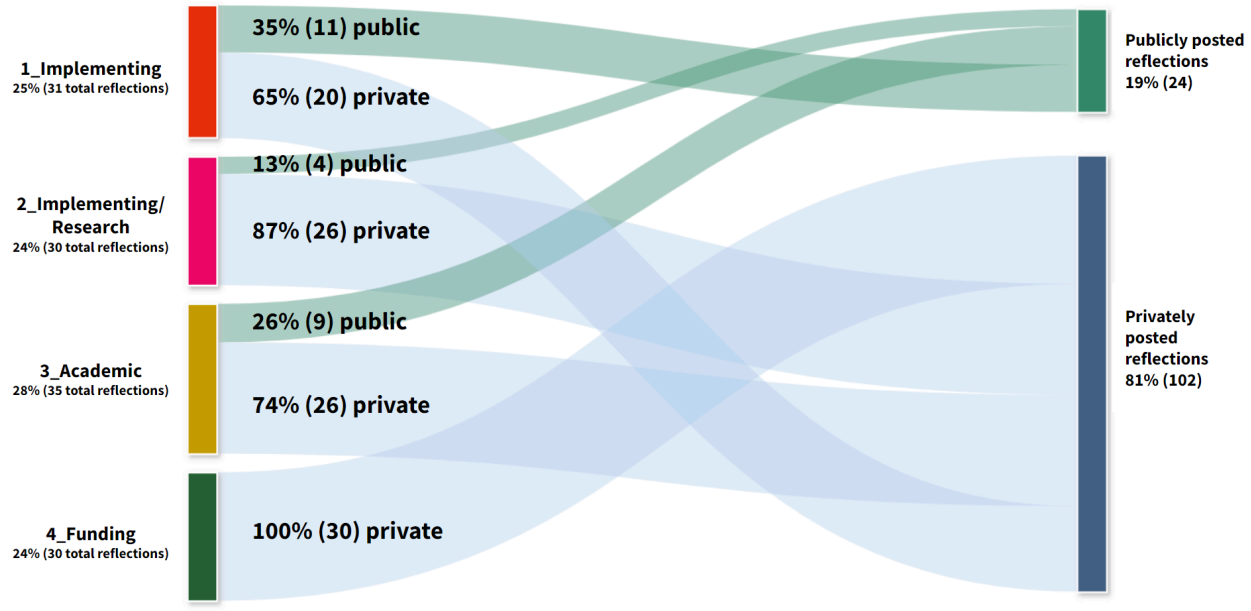
Figure RQ2.2-1. Sankey Diagram displaying number of questions answered per organization by the role each participant selected



Posting public or private reflections

During the study, participants had the option to send their reflections either 'privately' to the research team or to post them publicly on the (re)imaginator's connect page. Out of the 134 responses, only 19% (24 posts) were publicly shared. Notably, the implementing organization had the highest proportion of public posts (35%), while all participants from the funding organization chose to keep their responses private. Participants with higher education levels (e.g. terminal graduate degrees) tended to choose private posting more than those master's or bachelor's degrees..

Figure RQ2.2-2. Publicly- and privately-posted reflections on (re)imaginator by organization type



Participants described their decision in various ways. Some chose to post publicly because they believed their answers may be valuable to others by sharing insights and fostering collective reflection. Those who posted privately gave a variety of reasons with:

- Allowing unpolished reflection without the pressure of public scrutiny
- Uncertainty about the correctness of their reflections
- Some participants noted that their reflections contained sensitive information
- Others wanted to avoid biasing others reviewing the website or accidentally causing harm

Only 2 of the 6 participants from the organization responded to the survey. This low response rate limits a more detailed understanding of the rationale behind their decision to post their reflections privately.

Participants reported insufficient time for using (re)imaginator

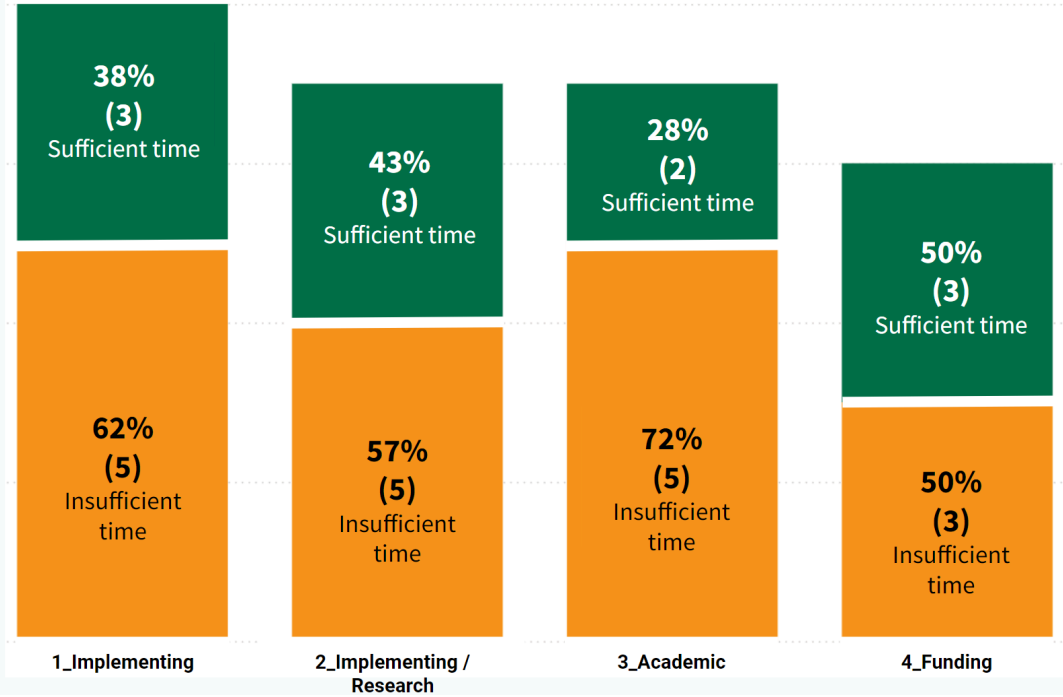
Directly after using the *(re)imaginator* for 15 minutes, 61% of participants reported that they had "too little time" to use the *(re)imaginator*. Of the 61% (n=17) of workshop participants who reported they had *insufficient* time to use *(re)imaginator* for reflection (Figure RQ2.2-3). Most shared that 30 minutes would be sufficient, while several others suggested that 45 minutes *or more* would be needed. Several people mentioned the newness of reflection/tool with a desire for more time to "think more." One person suggested that there would be a difference in the amount of time needed for ongoing versus new projects, needing 15-20 minutes for existing projects and "at least" 30 minutes for a project "in development."

Overall, many also expressed sentiments of wanting to first understand how many questions were available for each role so they could either pace themselves (with the expressed intent to go through *all* the questions) or wanting to see and select the most relevant questions.

> Maybe 30-60 minutes, depending on how many questions I feel like answering or have the energy to focus on. But there are lots of questions and it's hard to navigate to select the ones that are most interesting/relevant.

Of the 39.3% (n=11) participants who reported that they had *sufficient* time for reflection they expressed different reasons for saying this was sufficient. Several stated that 15 minutes was sufficient for a "quick start into the process" but would like to see this as part of a facilitated discussion. As one person added, "critical reflection would need multiple sessions over a longer period of time… and maybe serving as a springboard for a later discussion."

Figure RQ2.2-3. Participant report on timing



Perceptions of *(re)imaginator* in supporting reflection

The second part of this question explores participant perceptions of using *(re)imaginator* to support reflection. This is mostly based on Benveltzen et al. Technology-Supported Reflection Inventory (TSRI) [19] and also draws on the qualitative data from workshop discussions.

Effectiveness of the (re)imaginator tool in supporting reflection

The Technology-Supported Reflection Inventory (TSRI) [19] assessed whether the *(re)imaginator* tool was effective in provoking reflection using nine questions across three key dimensions:

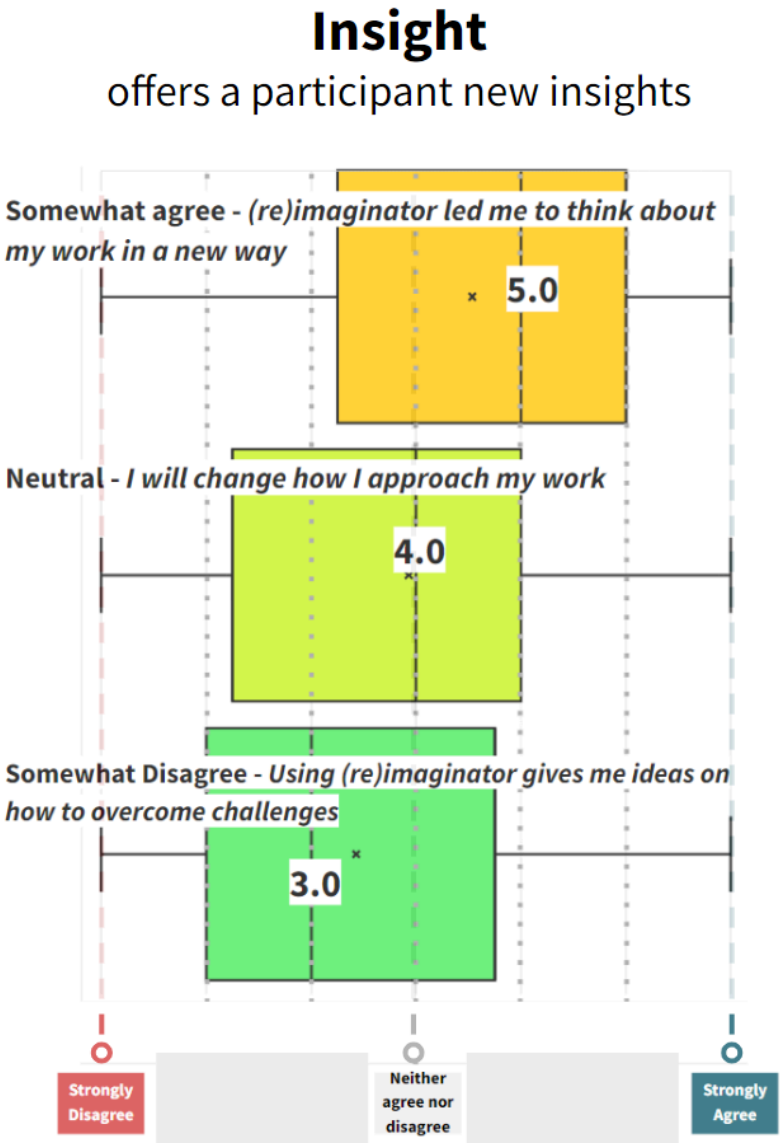
- *Insight* dimension evaluates whether the technology offers a participant new insights (Figure RQ2.2-4)
- *exploration* dimension measures the participant's "ease and enjoyment" of using the system (Figure RQ2.2-6)

- *comparison* looks at the social dimension meaning how participants can compare their answers to others (Figure RQ2.2-7)

Participants gave a response on a 7-point Likert scale from Strongly Disagree to Strongly Agree. The Figures show the boxplot, highlighting the median and average that indicates how 50% of participants responded (median) and the average score. Using these two numbers shows the "skewness" of the responses, showing whether participants more strongly agreed or disagreed overall; if the average is below the median it means participants had lower scores, for example.

The ***insight*** dimension (top boxplot Figure RQ2.2-4) evaluates whether the technology offers a participant new insights. Participant scores for all three questions spanned the range from strongly disagree to agree.

Figure RQ2.2-4. Insight dimension median TSRI scores, with the line and number showing median and the 'x' is average score



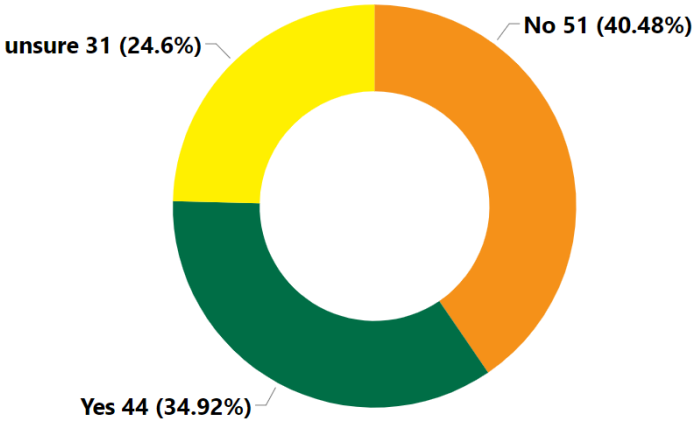
For the first question, 50% of participants "somewhat agreed" that the *(re)imaginator* supported them in thinking about their work in a new way. There was a range across participants; however, showing that participants expressed all levels of agreement, from strong disagreement and strong agreement. As one participant described the *(re)imaginator*,

> makes you think beyond, beyond your normal thought, you start thinking quite differently actually. So the very same things which you, you see as normal in terms of project implementation, you now start thinking uh differently, like maybe we should have done more differently.

Participants were neutral in whether they would change their work approaches as a result of using the intervention (middle boxplot Figure RQ2.2-4). This was echoed by the question captured on the *(re)imaginator*

website that asked participants whether they would plan to take action based on the reflection they had just written. Of the 126 reflections submitted, participants shared that they did *not* plan to take any action based on their reflection 40% of the time (n=51 reflections) (Figure RQ2.2-5).

Figure RQ2.2-5. Responses from (re)imaginator to questions "do you plan to take any action based on your reflection?"



Despite the negative response to change in thinking, one participant critiqued their experience by sharing:

> So some of the questions, like I said, it didn't prompt so much a critical reflection for me, but an opportunity to reflect on a particular research project that I was involved in and think about, "oh, how did all this manifest in that particular project"? So *that* was helpful. But when it came to the questions, did this change your perspective in some way? I kept answering…. you know, no, not really, but it did give me a chance to do that.

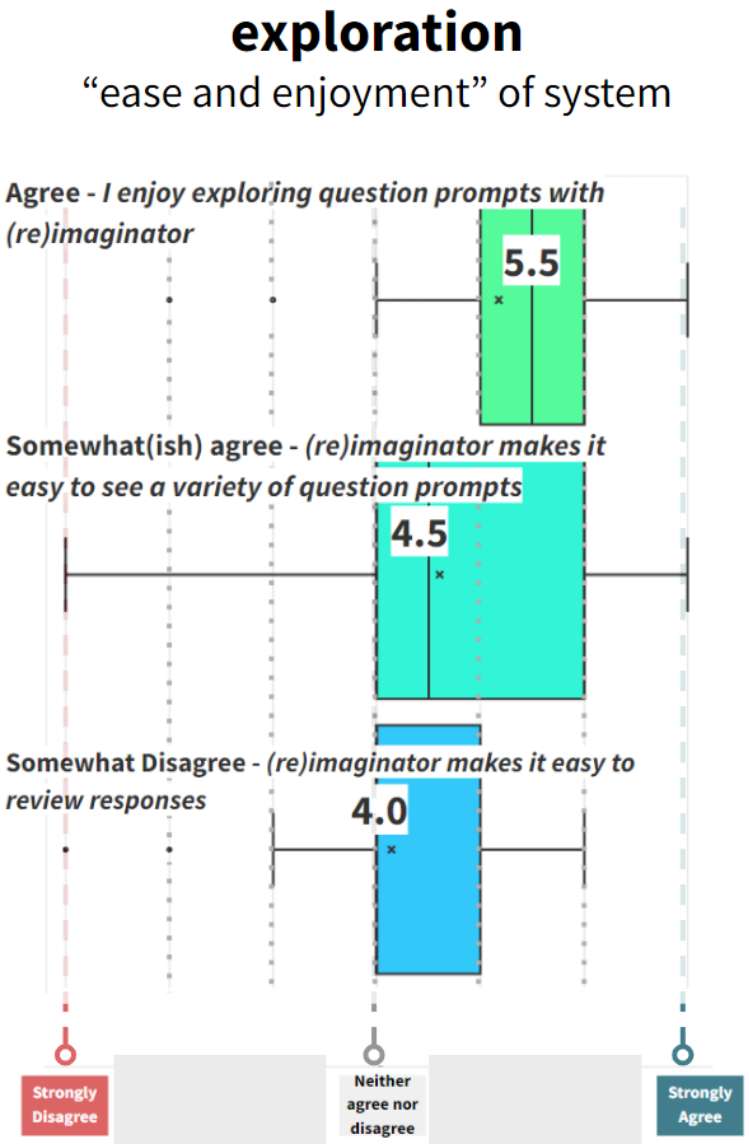
Participants also somewhat disagreed that using the intervention gave them ideas on how to overcome challenges. This was echoed in the discussion.

> One of the things I was struck by is um um I, I didn't often click, this will make you do something different or whatever the question was. Um But I did, I, I once clicked. Yes. And then there was, I thought it would actually give me space to write that out, which I would have wanted if I was really going to reflect. And so I was wondering since you did do the questions that made you think differently. Did you want space to actually process that reflection?

The *exploration* dimension measures the participant's "ease and enjoyment" of using the system (Figure RQ2.2-6). Participants rated their enjoyment exploring the questions as the highest in the TSRI survey. 75% of respondents agreed that the tool supported enjoyment, though there was a range of all ratings from *disagree* to *strongly agree*. They *somewhat-ish agreed* that the intervention made it easy to see a variety of question

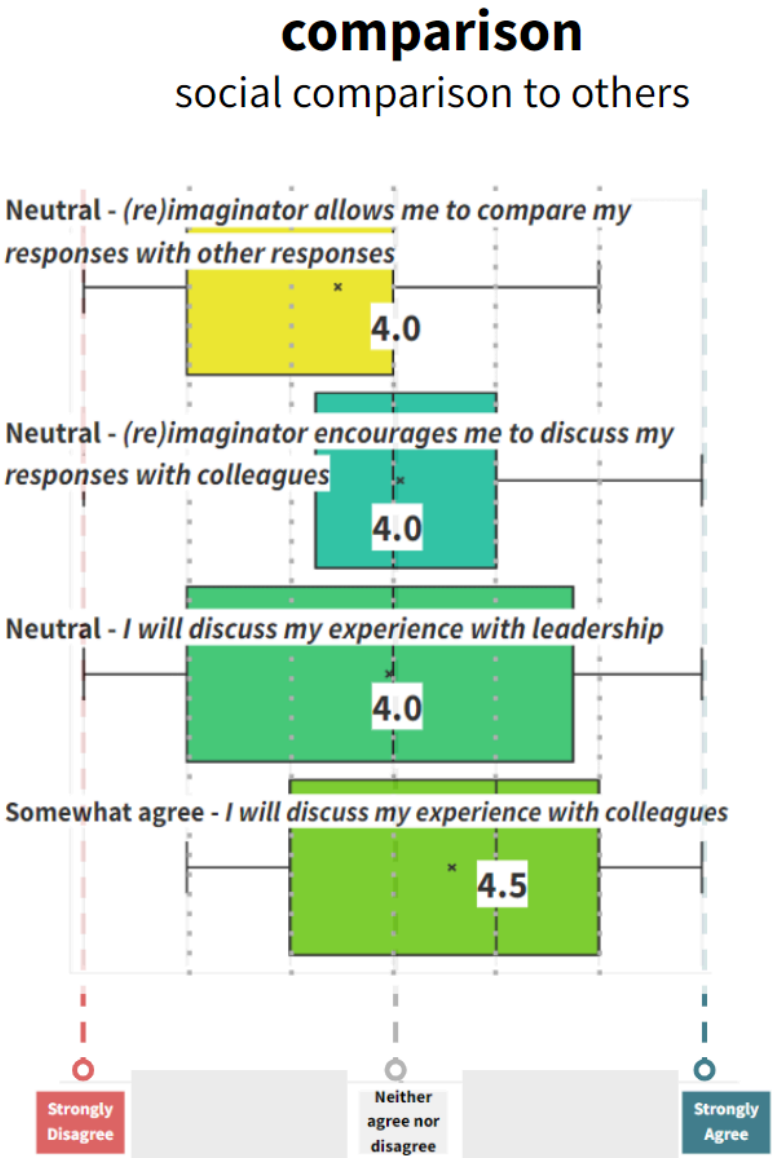
prompts, with roughly 75% of participants ranking this above neutral. Participants were neutral about whether the *(re)imaginator* made it easy to review question responses.

Figure RQ2.2-6. Exploration dimension median TSRI scores, with the line and number showing median and the 'x' is average score



Finally, the *comparison* looks at the social dimension meaning how participants can compare their answers to others. Participants were neutral on three of four questions in this dimension, highlighting limited comparison of their responses with others. Interestingly, while participants were neutral on whether they would discuss their reflection question prompt responses using *(re)imaginator* with colleagues, they were somewhat supportive of sharing their experience with colleagues. They were neutral on whether they would share their experience with

Figure RQ2.2-7. Comparison dimension median TSRI scores, with the line and number showing median and the 'x' is average score



TSRI Scores Summary

Overall, the majority (57%) of participants reported that using *(re)imaginator* led to a "wake-up call to make changes in my work." 78% of participants reported that they enjoyed exploring question prompts with the *(re)imaginator* and that the tool makes it somewhat easy to review a variety of question prompts. Participants were neutral about the ability to compare responses. This was echoed in the group discussion about *(re)imaginator* where several participants gave design ideas for improving comparison, including an academic who said,

> I don't know if that's in the kind of the beta test of the version, but I wasn't able to see other people's responses. I wasn't able to see my other responses. And I think it would be helpful maybe at the end of going through a set of reflections on my own to have like a pop-up cloud of other people's projects answers… or you could see a list of what settings and what kinds of projects and roles that other people responded to and click on that to see what kind of other responses people have have made.

Looking at TSRI scores across organization types (disaggregated boxplots in Appendix 4), the funding organization rated *(re)imaginator* as neutral or below for all dimensions except enjoying the experience and seeing a variety of question prompts. Both the implementing organization and implementing/research organization ranked the insight dimension of "thinking about my work in new ways," while both academic organization and funding organization rated this as neutral. This shows the differences in participant sample sizes for the overall median. The implementing/research organization had the highest rating of enjoyment using exploring question prompts.

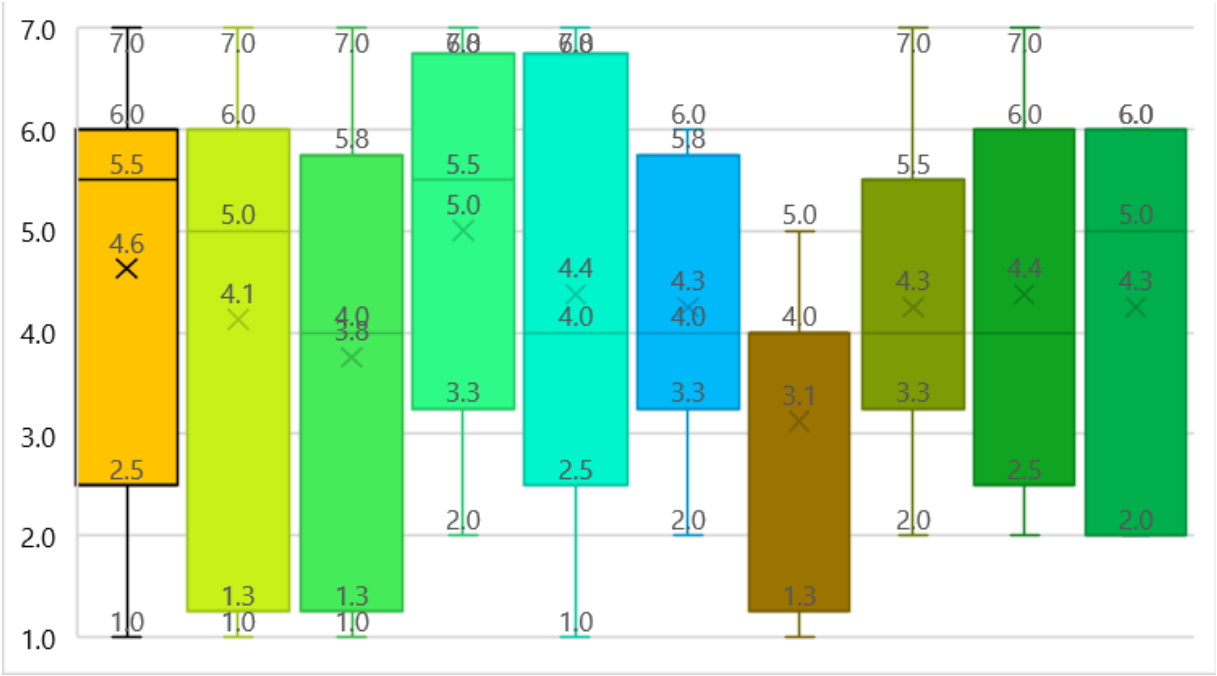
The implementing, implementing/research, and academic organizations all shared that they would discuss their experience using *(re)imaginator* with their colleagues. Over 50% of participants from both the implementing and implementing/research organization noted that they would share their experience with organizational leadership, while academics and funders were not inclined to share with leadership.

Figure RQ2.2-8. Technology-Supported Reflection Inventory disaggregated by Organization type, with color key

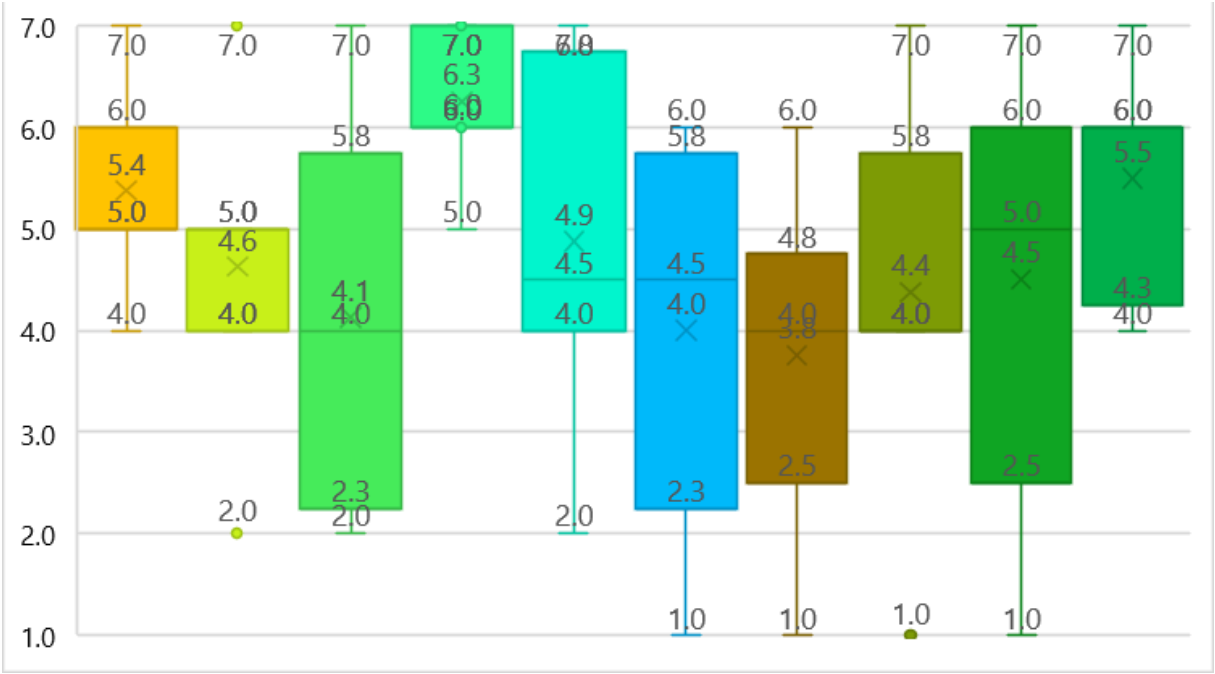
X-axis Color Key, Order left to right	***TSRI Question prompt As a result of using the (re)imaginator website….***
	(re)imaginator led me to think about my work in a new way
	I will change how I approach my work
	Using (re)imaginator gives me ideas on how to overcome challenges
	I enjoy exploring question prompts with (re)imaginator
	(re)imaginator makes it easy to see a variety of question prompts
	(re)imaginator makes it easy to review responses
	(re)imaginator allows me to compare my responses with other responses
	(re)imaginator encourages me to discuss my responses with colleague
	I will discuss my experience with my leadership
	I will discuss my experience with my professional peers

Y-axis Score	***Likert Scale***
7	*Strongly Agree*
6	*Agree*
5	*Somewhat agree*
4	*Neutral*
3	*Somewhat disagree*
2	*Disagree*
1	*Strongly Disagree*

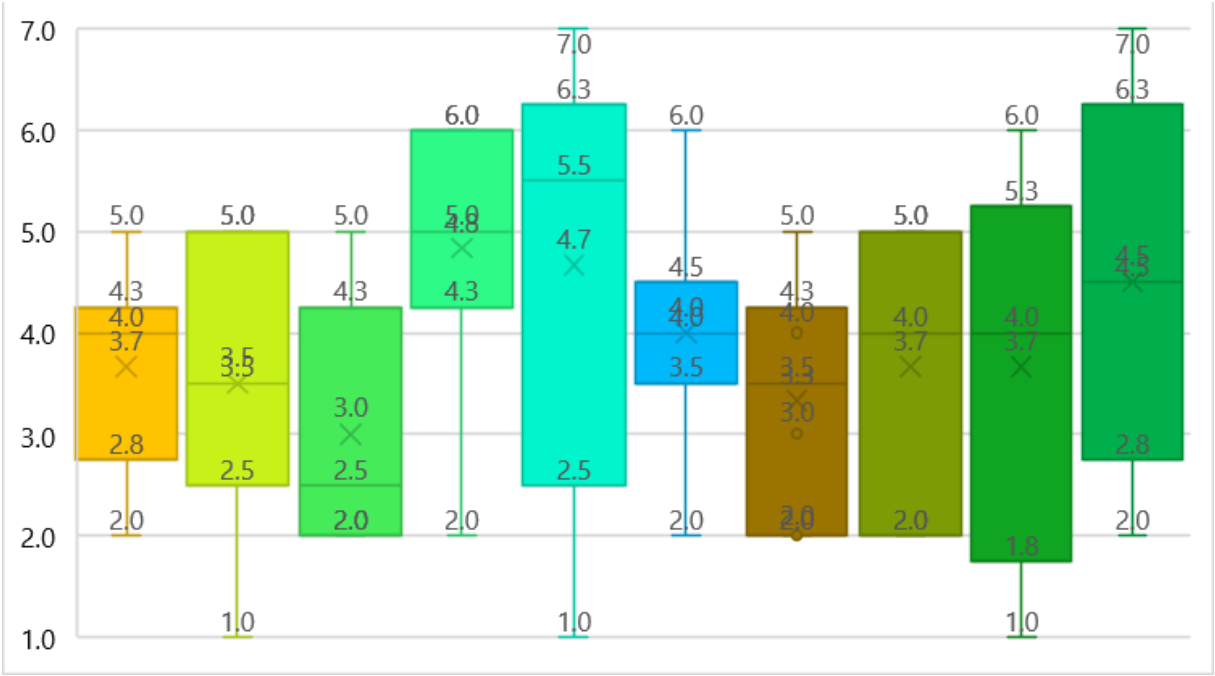
Implementing Org



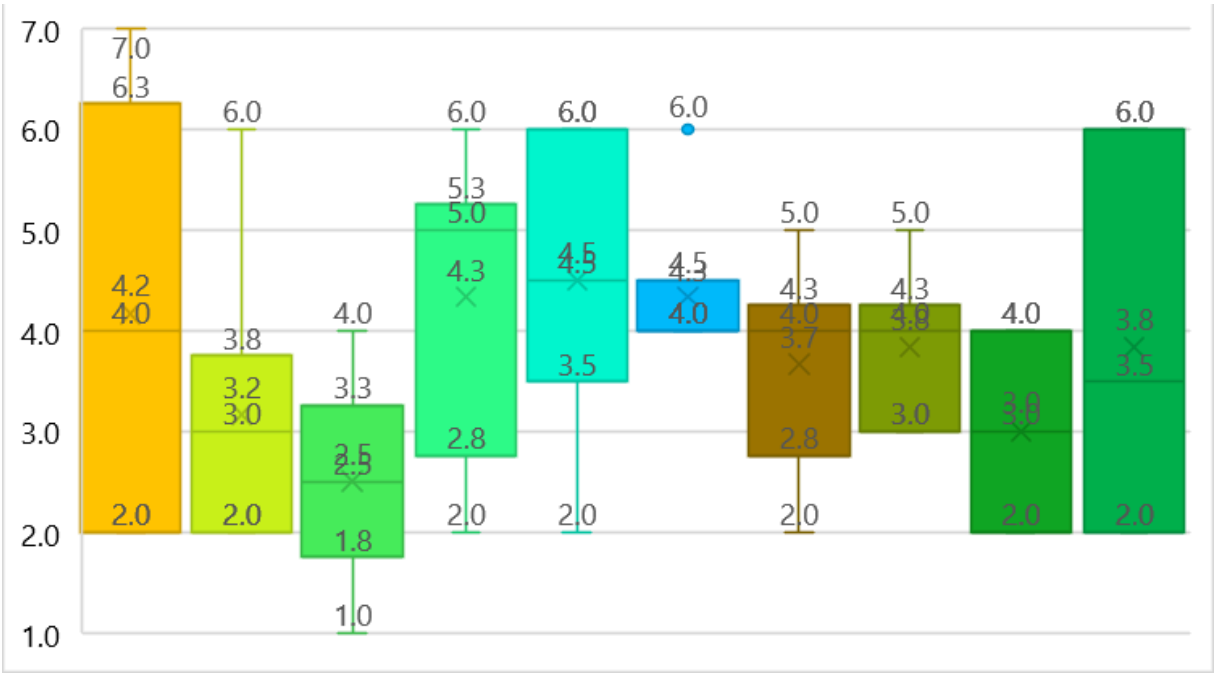
Implementing/Research Org



Academic Organization



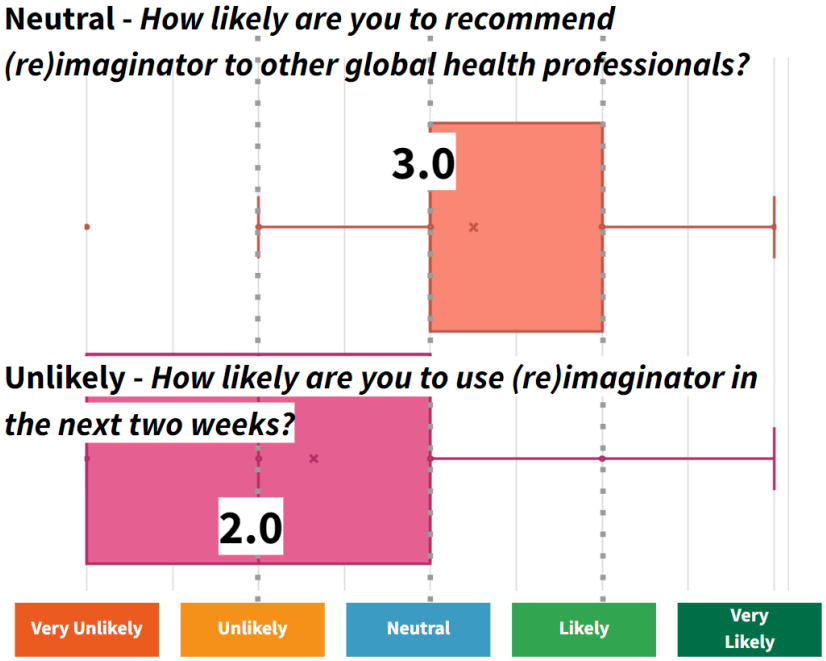
Funding Organization



Sharing and use

Overall, participants were *neutral* on recommending *(re)imaginator* to colleagues, also reported being 'unlikely' to use the tool in the next two weeks (Figure RQ2.2-9). When disaggregated by organization type, both the Implementing and Implementing/Research Organizations' participants reported they were "likely" to share the *(re)imaginator* with colleagues (Appendix 4 for boxplots and data tables disaggregated by organization type).

Figure RQ2.2-9. Boxplot of of likelihood of recommending and using the (re)imaginator



Sharing and use Disaggregated Data

Likelihood of recommending and using *(re)imaginator* by Organization type, Scale of 1-5 from Very Unlikely to Very Likely

Overall (all organizations)	***Implementing Org***	***Implementing/Research Org***

Data tables of recommending (re)imaginator disaggregated by organization type

Recommending (re)imaginator	1_Very unlikely	2_Unlikely	3_Neutral	4_Likely	5_Very likely	**Total**
Academic org		1	5	1		**7**
Funding org	1	2	2	1		**6**
Implementing / Research Org		1	2	3	1	**7**
Implementing Org			3	4	1	**8**
Total	**1**	**4**	**12**	**9**	**2**	**28**

Table 5.2.2.XXX: Likelihood of using (re)imaginator in next two weeks by organization type

Group_category	1_Very unlikely	2_Unlikely	3_Neutral	4_Likely	5_Very likely	**Total**
Implementing Org	2		3	3		**8**
Academic org	4	2			1	**7**
Implementing / Research Org	1	3	2	1		**7**
Funding org	3	1	1	1		**6**
Total	**10**	**6**	**6**	**5**	**1**	**28**

Participant recommendations for improving *(re)imaginator*

Participants gave many suggestions for how to improve the intervention to better support and guide global health practitioners to reflect. The following are the main themes,

Clarify Goals and *(re)imaginator* Guidance: Participants emphasized the importance of clear instructions and focused prompts to guide the reflection process effectively. This includes providing context upfront about the purpose of reflection and what specific aspects should be reflected on to avoid confusion.

Several participants noted that they were unclear about whether tool was designed to decolonize global health, whereas others thought that the intention was clear

Participants expressed uncertainty about the goal of the reflection and how the tool would be integrated into the process of a global health project.

Making *(re)imaginator* more culturally relevant: The participant emphasizes the importance of using inclusive language that considers diverse perspectives and avoids western-centric terms, especially when reflecting on global health. The tool was criticized by one participant for its tone that seemed to assume that no one is reflecting on their work, highlighting that some questions were “loaded with assumptions.” As one participant described.

> I agree with the thing about language, just not, not just French, but I think… if we're talking about global Health we have to be thinking about many languages um… and also the vocabulary and the words um because even just saying global health has a different meaning um or like from a western point of view versus like other people

This was echoed by another North American participant was also specific name on the name of the intervention being

> … if you're for someone who is maybe used to some of those like vocabulary and language, they're going to understand the questions. But if someone isn't, they're gonna totally miss the point. Like even the name of the tool putting “re” in parentheses is like a very uh like critical geography, critical approach. But I think if you're not familiar with that field of like literature, you wouldn't even know what, what that means.

Streamlined Interface and Reduced Repetition: Participants disliked re-entering the same information and encountering repeat prompts. One participant reported that they received the same prompt three times in a row despite clicking “skip”; highlighting a potential bug. Comments like "not a good use of my time" highlight their frustration. Features that automatically populate past information around the project details that are optional requests for each reflection and streamline the reflection process were highly valued.

Transparency and User Control: A user-friendly interface that minimizes repetitive tasks emerged as a key feature. Participants disliked having to re-enter the same information repeatedly as it did not feel like a “good use of my time.” Features like auto-populating previously entered project details and avoiding redundant prompts within the reflection process were seen as valuable improvements. One participant noted that the system delivered him the same question three times. Some participants suggested having fewer and shorter questions.Some participants found the question prompts generic and not tailored to support reflection. Participants were inclined to reply to all of the questions, rather than use it to answer a few questions. Desire for a more informative display of their progress through the tool, including a list of all questions at the beginning.

Tool could be structured around themes (e.g., power dynamics, community engagement) so that users can know in advance what to expect. Other users wanted to see all prompts and be able to select the most relevant prompts for their work to create a more tailored "reflection panel." Participants suggested making it clear upfront that users can switch roles later.

Simplifying questions and customizing question sets: There were mixed preferences regarding the number and focus of questions. Some participants felt the prompts were generic and desired fewer, more tailored questions. A suggestion to structure the tool around themes (e.g., power dynamics) could address both preferences, giving users an idea of areas covered while allowing selection for specific reflection needs.

Many participants cited that the questions were "confusing" and that they struggled with the length of some questions. Others skipped questions not because they were confusing, but "so complex and multi-layered" with one participant suggesting splitting these questions into several different questions.

There seemed to be a desire for more orderly experience so they could build on their reflections. Many expressed uncertainty in how questions were ordered, describing it as "random," "unstructured." Participants across all groups expressed this idea, with one one participant describing this need;

> I would say, not necessarily the right, the right word but "randomness" like we like, I felt like it was, {audio breaks up} I mean, yeah, one thing to another… which is not necessarily bad… like, especially when you only have 15 minutes to think of… on something. It doesn't necessarily help you build on like previous reflections or something.

Several requested seeing (even downloading) all questions upfront for a comprehensive view.The ability to personalize the reflection experience was also strongly expressed. Participants suggested features like pre-built question packages on specific themes. Others expressed desire to create a "reflection panel" where they could curate a selection of relevant questions from a larger pool, based on some kind of preliminary "assessment" to tailor the questions.

Participants also highlighted the desire for questions to help capture implementation data and metrics so they could reflect on the impact of their programs. One participant from the implementing organization suggested using the tool's data alongside existing Performance Measurement Plans (PMPs) to evaluate if the tool contributes to achieving set targets. As one participant described,

> …given that there are probably many and not, not every question is going to be relevant to every project. And so it might be useful to be able to see that upfront and sort of select 'these are, this is the reflection tool that I would like to build' and then go forward with that.

More support moving from reflection to reflecting on action: Incorporate prompts that encourage users to not only reflect but also articulate concrete action steps. Actionable prompts (Action-Oriented Prompts) bridge the gap between reflection and taking concrete steps for improvement. Encouraging users to consider concrete actions and next steps following reflection. The participant highlights the importance of capturing data to assess the impact of implementing a reflection tool. They suggest using the tool's data alongside existing Performance Measurement Plans (PMPs) to evaluate if the tool contributes to achieving set targets (W1). The participant

suggests using data analytics from the reflection tool to inform decision-making at various stages. They emphasize the importance of the tool reminding users of the "immersion process" needed to achieve goals, which can be interpreted as ensuring deep reflection

> I think having some, you know, if, if the idea is to get people to take action, I think that, you know, it's easy to click a button and then move on and forget about it. But if you're kind of brought to write down what are the actions I might take? What's my next step? I think it's more likely than that, that will happen.

Expand social features in the *connect* Forum: Participants also shared a desire for more connections between their reflections and others'. They saw an opportunity to leverage the power of shared learning and to learn from each other's experiences. Participants expressed a desire to be able to see a record of their responses. Participants recommended making it easier to view other responses to similar questions, which could provide a variety of perspectives.They shared that enhancing this feature may facilitate a sense of community, while also potentially fostering more accountability.

> But just in general, this type of like critical reflection, it's nice to have, right? It's… it is a learning process. And so just doing something on a screen alone doesn't provide the structure for when you are challenged by your held perspective, and a new perspective, you need like, you know, a nice way that is proposed by some people… is like the creation of a community that moves that forward. And so doing something that does have like community accountability and community support um might be better than just something that you're doing alone on a computer."

Add to the *Resource* Library: Participants also sought more resources that would connect their reflection to action. They suggested creating a library of case studies, best practices, and other resources to inspire and guide effective reflection in global health. Additionally they wanted to see *how* other people reflected and the impacts of this reflection. Suggest link resources, such as journal articles or videos, associated with each question after reflection. Users shared that this could help them reflect more outside of the tool and gain more information to share with others. As one participant described,

> …actually providing space to reflect on what is the action one might take. I wonder if there's also part of the website that actually… has case studies examples of the type of self reflective or work that you feel would be… really emblematic of self reflective work so that people could start to think.

RQ 3.1 | What level of perspective transformation do global health practitioners experience directly after using *(re)imaginator*?

Directly after using the *(re)imaginator* for 15 minutes, participants completed an individual survey, where they answered the Learning Activities Survey (LAS) to detect any changes in their perspective. Noting that the LAS is intended to measure longer-term interventions, the survey was split into two types of questions: whether the intervention provoked any changes in thinking (measured by Mezirow's Learning Stages 1 through 5 [40]) and whether they thought this experience would lead to any plans or actions (Figure RQ3.1-1). Highlights of the top stages of transformative learning are highlighted below.

Figure RQ3.1-1. Percentage of all participants replying "yes" to each stage

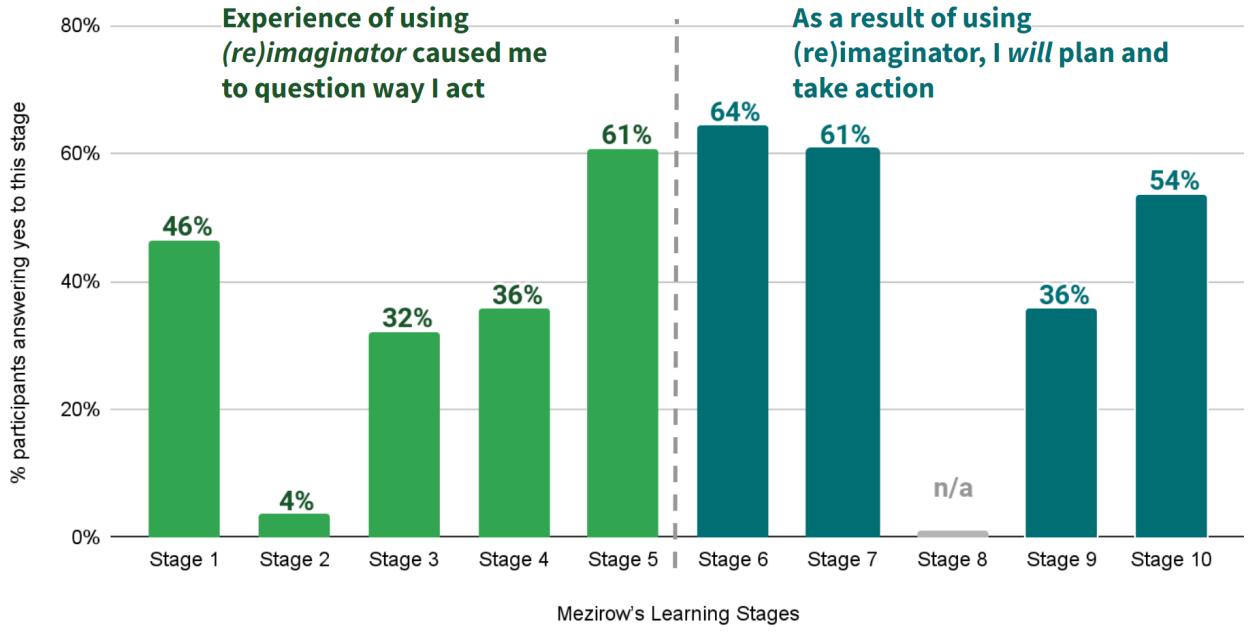


Table 2.2.6. Learning Activity Results for Mid-session survey

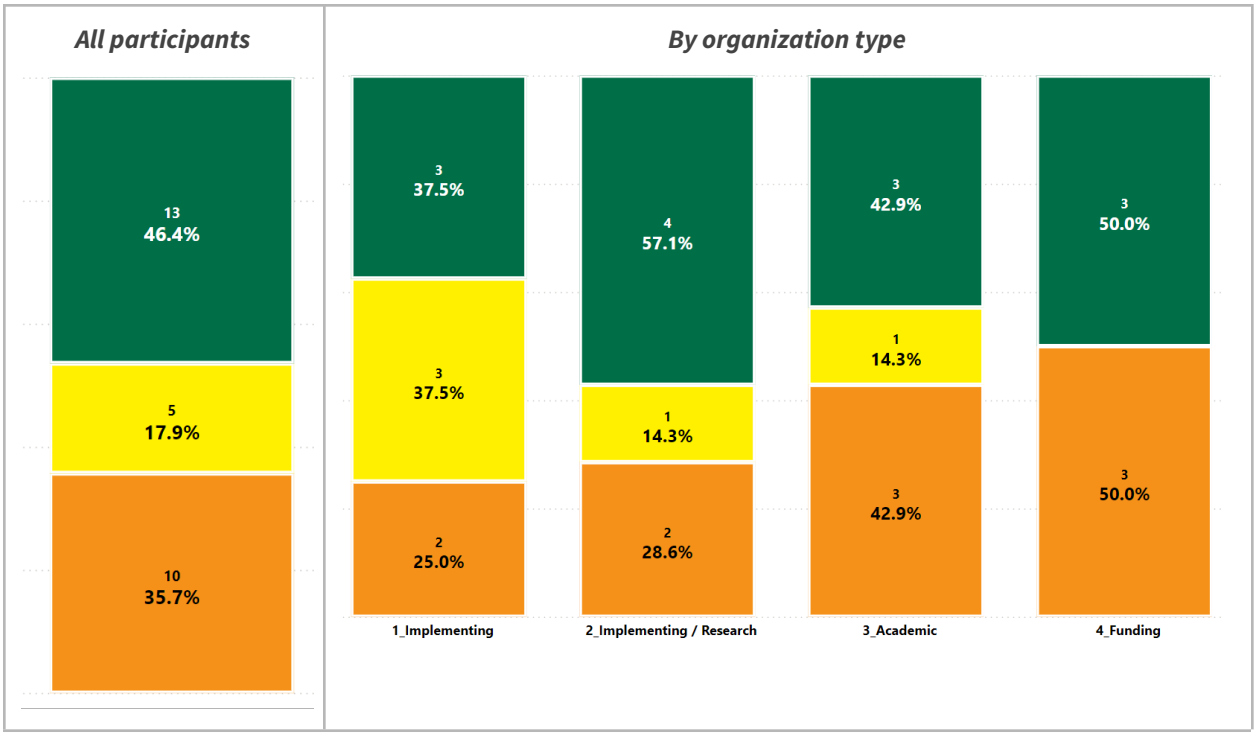
		Mid-workshop Survey n=28		
Survey Question (Appendix 2)	**Mezirow's Learning Stages** from King's original survey [88]	**Yes** n (%)	**Unsure** n (%)	**No** n (%)
a. This experience caused me to question the way I normally act	*Measures Stage 1: Disorienting dilemma*	**13** (46.4%)	**5** (17.9%)	**10** (35.7%)
b. This experience caused me to question my ideas about global health professional roles	*Measures Stage 1: Disorienting dilemma*	**12** (42.9%)	**2** (7.1%)	**14** (50.0%)
c. As I used (re)imaginator, I realized that I no longer agree with my previous beliefs or role expectations	*Measures Stage 2: Self examination*	**1** (3.6%)	**7** (25.0%)	**20** (71.4%)
d. As I used (re)imaginator, I realized that I still agree with my beliefs or role expectations	*Measures Stage 2: Self examination*	**20** (71.4%)	**4** (14.3%)	**4** (14.3%)

		Mid-workshop Survey n=28		
Survey Question (Appendix 2)	**Mezirow's Learning Stages** from King's original survey [88]	**Yes** n (%)	**Unsure** n (%)	**No** n (%)
e. As I used (re)imaginator, I realized that other people also question their beliefs	*Measures Stage 4: recognition that one's discontent and the process of transformation are shared & that others have negotiated a similar change*	**10** (35.7%)	**7** (25.0%)	**11** (39.3%)
f. As I used (re)imaginator, I thought about acting in a different way from my usual beliefs or roles	*Measures Stage 5: exploration of options for new roles, relationships and actions*	**17** (60.7%)	**4** (14.3%)	**7** (25.0%)
g. I felt uncomfortable with traditional professional expectations	*Measures Stage 3: a critical assessment of epistemic, socio-cultural or psychic assumptions*	**9** (32.1%)	**7** (25.0%)	**12** (42.9%)
h. I will gather information to try to adopt new ways of acting	*Measures Stage 6 planning a course of action*	**18** (64.3%)	**6** (21.4%)	**4** (14.3%)
*i. I **will** gather the information I need to adopt new ways of acting*	*Measures stage 7: Acquisition of knowledge and skills for implementing one's plans*	**17** (60.7%)	**6** (21.4%)	**5** (17.9%)
j. I began to think about the reactions from colleagues if I adopt new ways of acting	*Measures Stage 9: building of competence and self confidence in new roles and relationships*	**10** (35.7%)	**5** (17.9%)	**13** (46.4%)
*k. I **will** take action and adopt these new ways of acting.*	*Measures Stage 10: a reintegration into one's life on the basis of conditions dictated by one's new perspectives*	**15** (53.6%)	**9** (32.1%)	**4** (14.3%)

Stage 1: Disorienting dilemma - This experience caused me to question the way I normally act

Nearly half of participants said *(re)imaginator* helped them question the way they normally act, highlighting Mezirow's first stage of transformative learning where a learner experiences a 'disorienting dilemma'. (Figure RQ3.1-2). This highlights the idea that while using the tool a participant encounters an experience that challenges their current beliefs and assumptions about the world. This can be a confusing or unsettling event that disrupts their established way of thinking and acting. When disaggregated by organization type, nearly 60% of implementing-research participants reported that the tool helped them think differently.

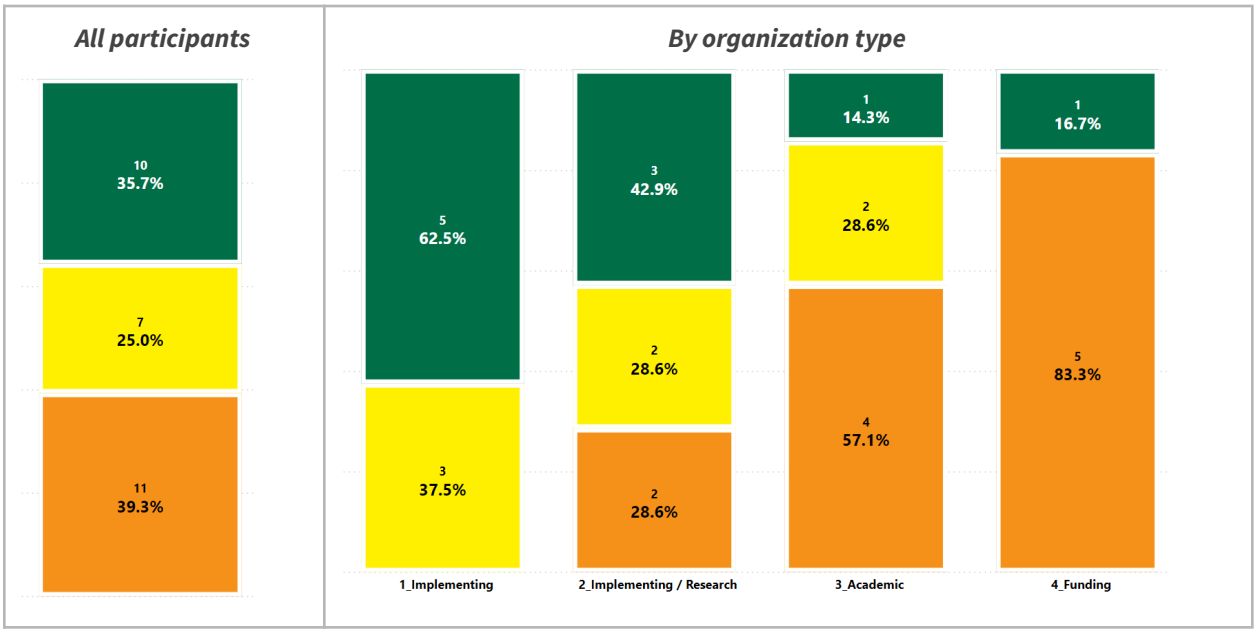
Figure RQ3.1-2. Disorienting dilemma mid-session survey results , where green is yes, yellow is "unsure, and orange is no



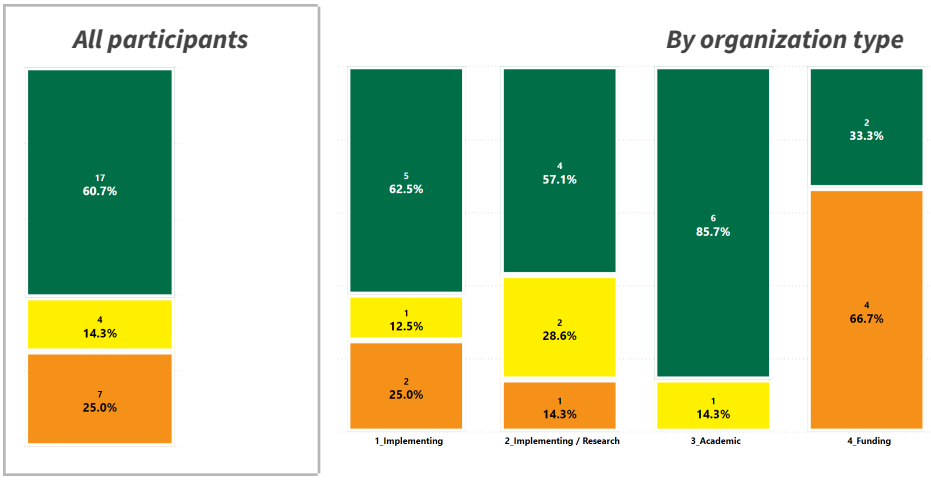
Stage 4: As I used *(re)imaginator*, I realized that other people also question their beliefs

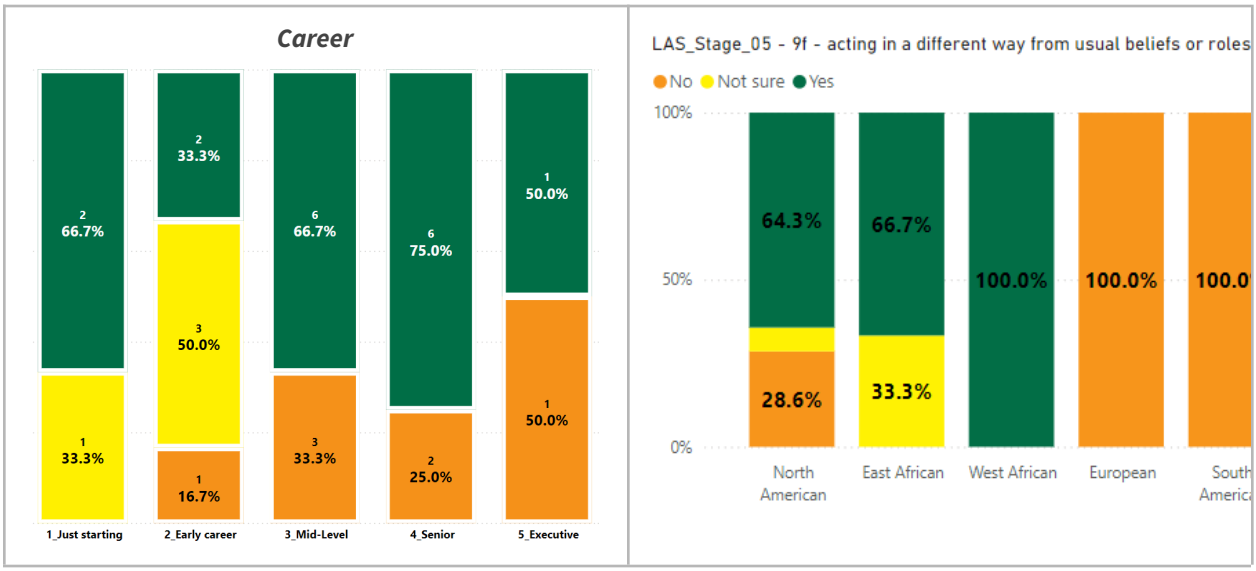
Using *(re)imaginator* did not provoke participants into seeing how others questioned their beliefs (Figure RQ3.1-3). The highest percentages came from Academic and Funding organizations. Importantly, all participants who responded 'no' were from North America.

Figure RQ3.1-3. Mezirow's stage four from mid-session survey, green = yes, yellow =unsure, orange =no



Stage 5: Exploration of options for new roles, relationships and actions - As I used (re)imaginator, I thought about acting in a different way from my usual beliefs or roles





Stage 6: Planning a course of action - I will gather information to try to adopt new ways of acting

Overall 60.7% of participants reported that they would gather new information about how to adopt new ways of acting for their career. There was a clearer signal for participants from implementing organizations expressing that they would gather new information, though with small samples sizes these are trends not significant differences.

Figure RQ3.1-4. Mezirow's stage six from mid-session survey, where green is yes, yellow is "unsure, and orange is no

Stage 10: I will take action and adopt these new ways of acting.

Over half (54%) of participants planned to take action based on their experience using *(re)imaginator,* suggesting that *(re)imaginator* may provoke the highest level of perspective transformation: moving from reflection to action, or at least a commitment to action. Participants from the implementing organization showed highest commitment along with East Africans; participant demographics show high overlap between these two groups. There was a "u" shaped commitment for action by career level, with those just starting and executives showing the highest commitment; mid-level career participants showest lowest likelihood.

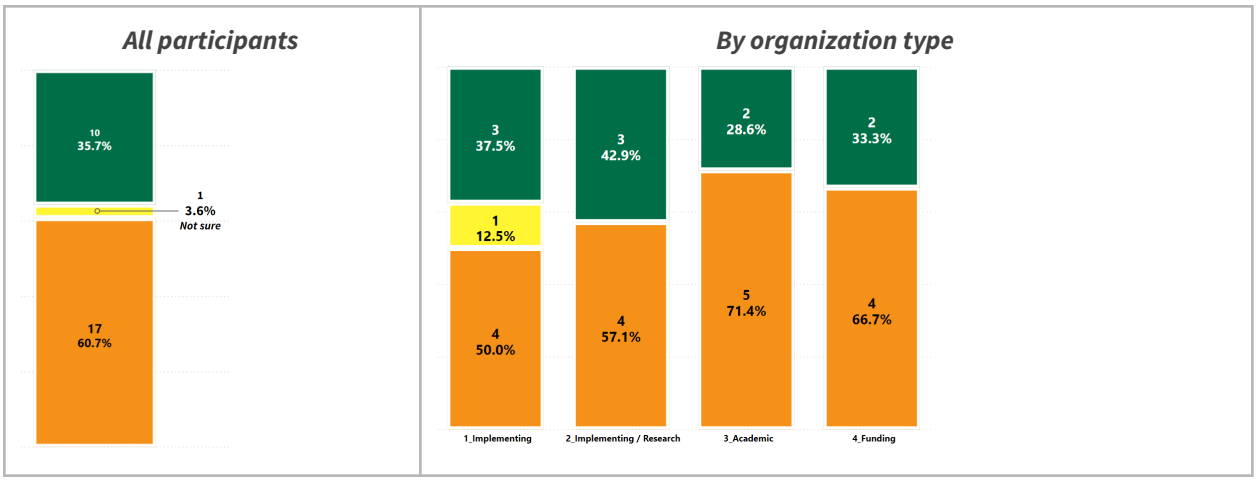
Figure RQ3.1-5. Mezirow's stage six from mid-session survey, where green is yes, yellow is "unsure, and orange is no. Bars display both n and percent by category.

Overall transformative learning

The last part of the LAS is a general question asking participants whether their "values, beliefs, opinions or expectations changed" based on using the *(re)imaginator*. The majority (64%) said they did not based on their experience (Table RQ3.1-6). Across all four organizations there was agreement that this would not change belief.

32% of participants reported that their beliefs changed, with 85% of these participants coming from the implementing and implementing/research organizations.

Table RQ3.1-6. Based on your experience using (re)imaginator, did any of your global health values, beliefs, opinions or expectations change? Bars display both n and percent by category.



RQ 3.2 | How does perspective transformation change over time?

At the two-week follow-up, most metrics for transformative learning dropped (Figure RQ3.2-1). Only two indicators showed an increase for stage 2—*I realized that I no longer agree with my previous beliefs or role expectations*— and stage 4—*I realized that other people also questioned their beliefs.* When mid-survey results for both Stage 2 and Stage 4 are disaggregated by respondents and non-respondents to the follow-up survey, there are no detectable differences in these groups compared with the all participants (Figure RQ3.2-2).

Figure RQ3.2-1. Comparison of the percentage of mid-session (n=28) and follow-up (n=23) survey respondents answering "yes" to each Learning Stage

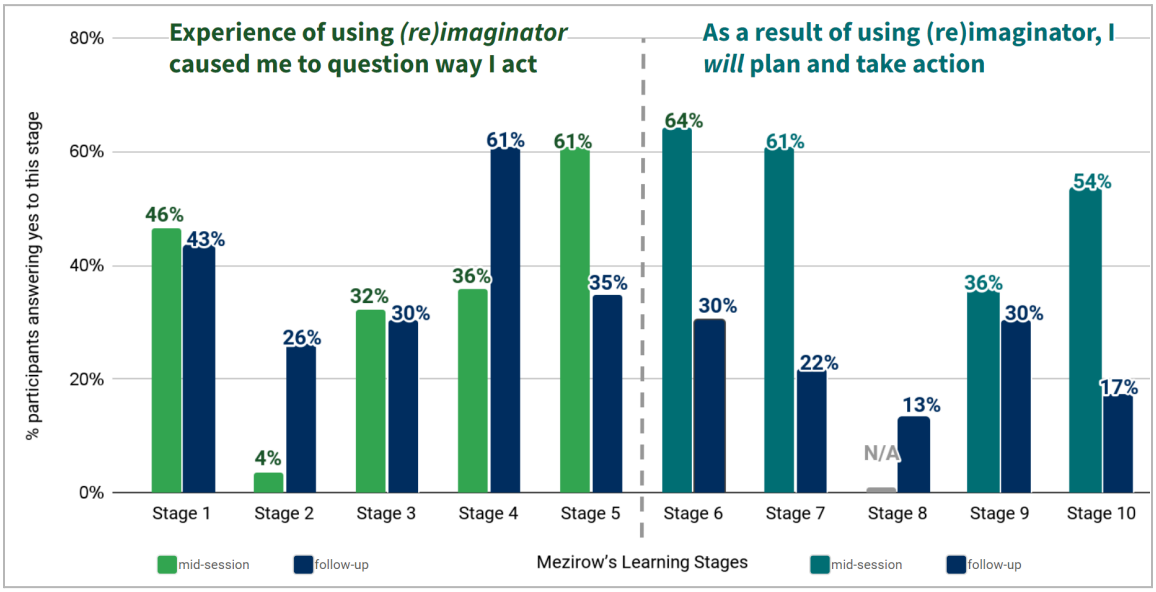
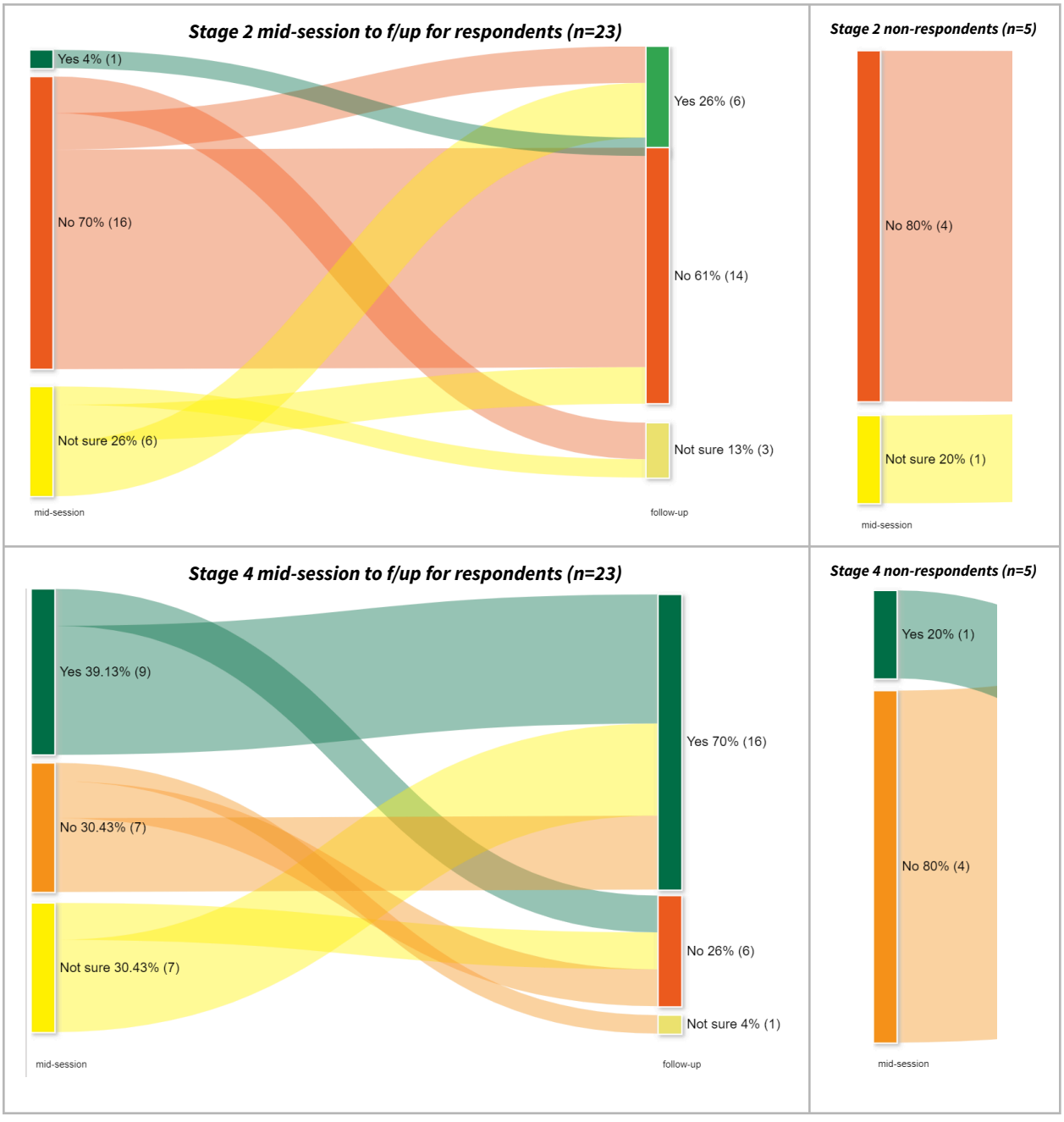


Figure RQ3.2-2. Stage 2 and Stage 4 results from mid-sesion survey broken down by respondents and non-respondents to follow-up survey, where green = yes, yellow=unsure, orange = no

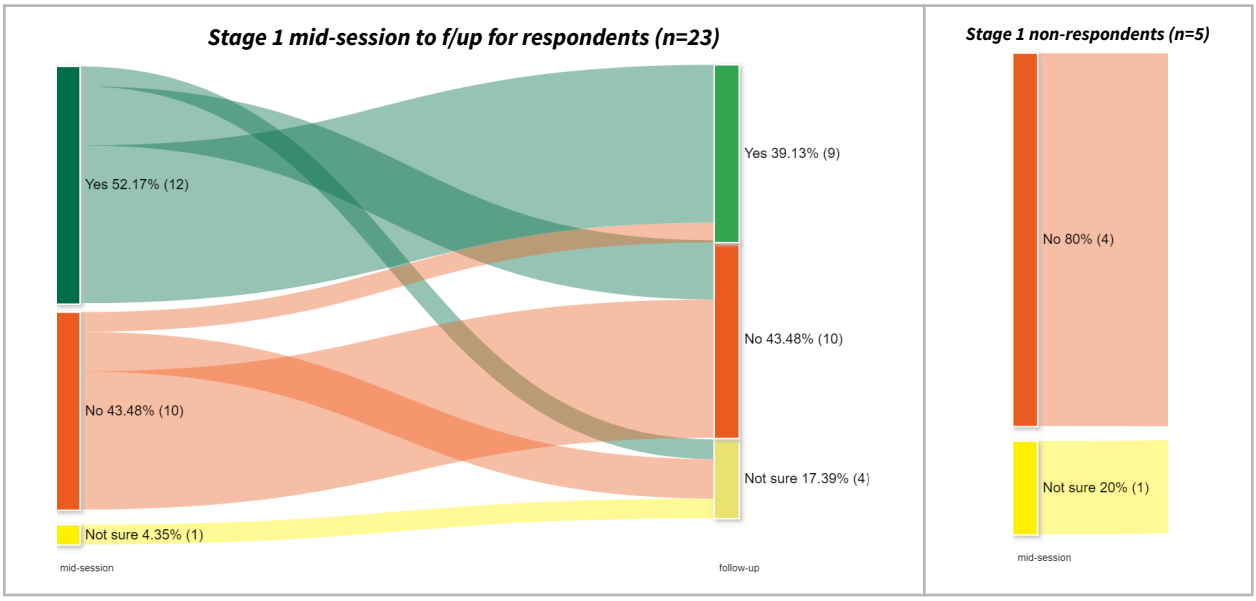


Stage 1: mid-session versus follow-up

Using *(re)imaginator* caused me to question the way I normally act

At baseline 52% of the 23 participants who responded to the follow-up survey reported that using the reimaginator caused them to question the way they act. At follow-up, 43% of these respondents still agreed with that statement. Looking at the changes between mid-session to follow-up, half of the participants still agreed at two-week follow-up that intervention caused them to question their thinking. Whereas only 33% (n=2) converted from a *no* to a *yes* at follow-up (Figure RQ3.2-3.). These echo the overall decrease seen in Figure 3.2-3.

Figure RQ3.2-3. Stage 1 mid-session to follow-up , where green = yes, yellow=unsure, orange = no

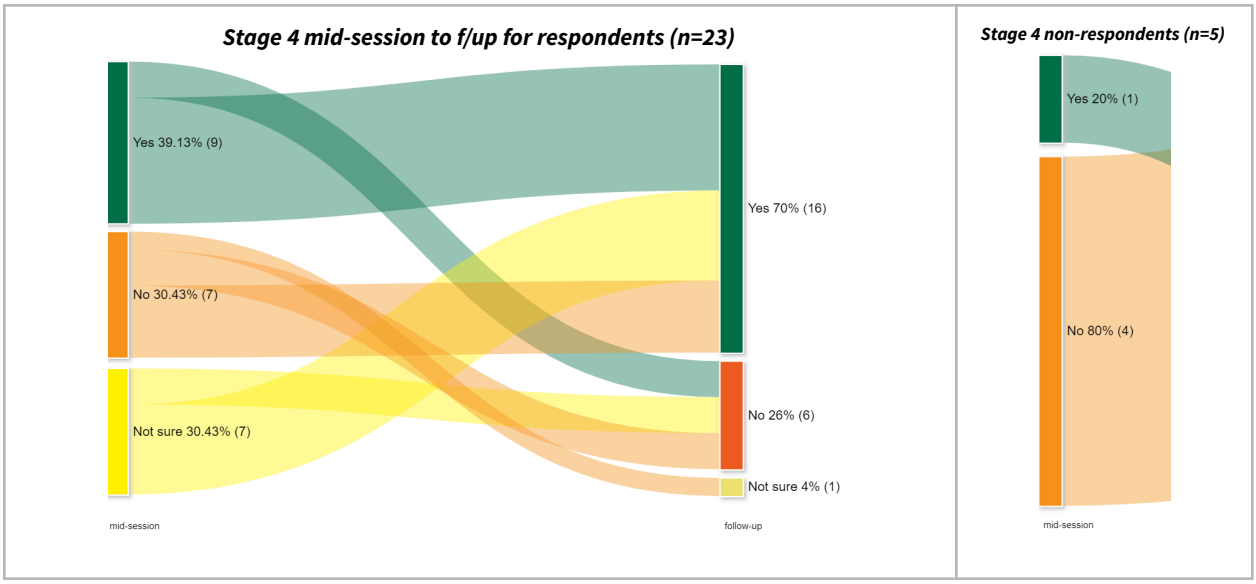


Stage 4 | mid-session versus follow-up

Moving from 'I will' to 'I have' realized that other people also questioned their beliefs

At baseline, just after using *(re)imaginator* but *before* the group discussion, 39% of the participants who responded to the follow-up survey said this experience helped them see that other colleagues questioned their belief. Two weeks later 70% of respondents said they realized that other people questioned their beliefs. 57% (4 of 7) of participants moved from *no* to *yes* at follow-up, and 72% who initially said they were *unsure* reported *yes* at follow-up. figures may be overrepresented given the baseline differences between respondents and non-respondents for this question.

Figure RQ3.2-4 Comparison of individual response changes between mid-session and follow-up surveys for Stage 4 (realizing other people also questioned their beliefs)

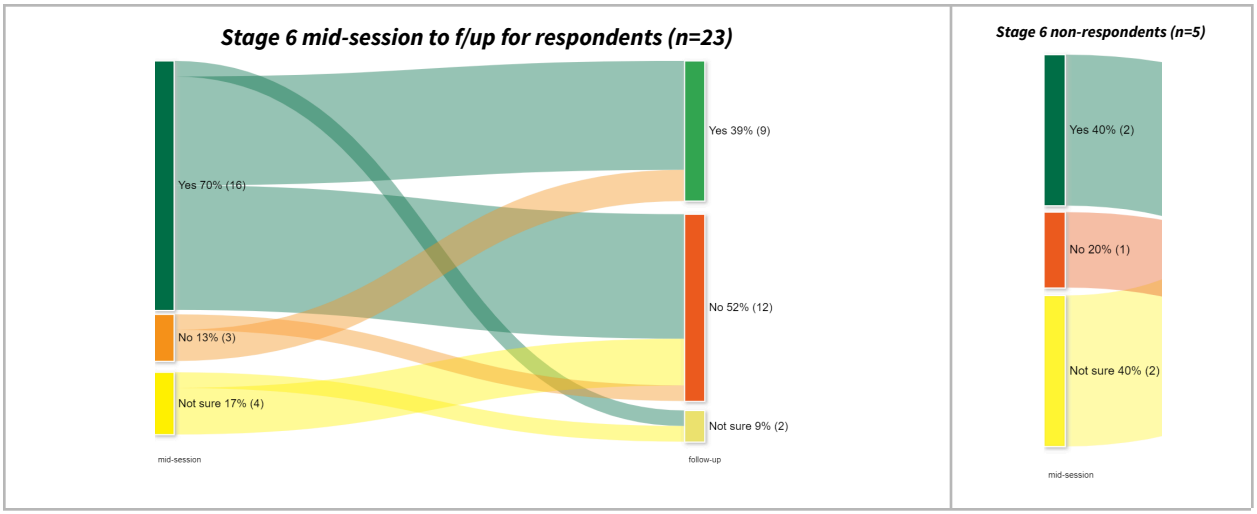


Stage 6 | mid-session versus follow-up

Moving from 'I will' to 'I have' have tried to figure out a way to adopt new ways of acting

While 70% of participants who responded to the follow-up survey noted that they would "gather information to try to adopt new ways of acting," at the two-week follow-up 39% reported that they had gathered new information (Figure RQ 3.2-5). Half of the participants who reported that they would gather new information had not done so at two weeks, while 2 people who had not planned to gather new information reported that they had at the two week follow-up. This percentage would likely decrease if non-respondents had completed the foll-wup survey given that 60% of respondents shared they would not or were not sure if they would gather new information (versus 30% of respondents who did respond to the survey).

Figure RQ3.2-5. Comparison of individual response changes between mid-session and follow-up surveys for Stage 6 (gathering new information)



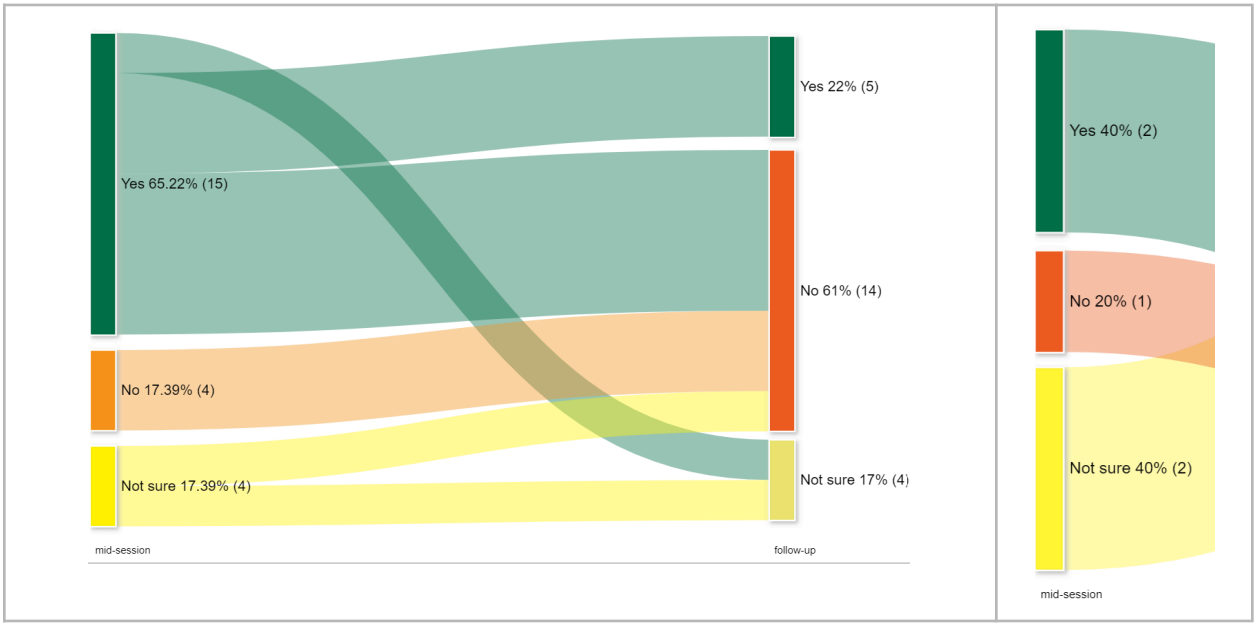
Stage 7 | mid-session versus follow-up

Moving from 'I will' to 'I have' gathered the information I needed to adopt these new ways of acting

While 65% of the 23 participants who responded to the follow-up survey planned to gather new information to adopt new ways of acting, two weeks later only 33% (5 of the 15) had done so representing 22% of the total follow-up participants. This suggests that while participants *committed* to taking action, few had done so within the two week follow-up. This is a further indication of no change in action within two weeks of exposure to the Design Workshop and *(re)imaginator*. Additionally, the 22% at follow-up would likely be lower if the non-respondents had participated in the follow-up survey given 60% at mid-session survey were not sure or not going to gather new information.

Figure RQ3.2-6. Comparison of individual response changes between mid-session and follow-up surveys for Stage 6 (acquired new skills)

Stage 7 mid-session to f/up for respondents (n=23)	*Stage 7 non-respondents (n=5)*



Stage 10 | mid-session versus follow-up

Moving from 'I will' to 'I have' taken action and adopted new ways of acting

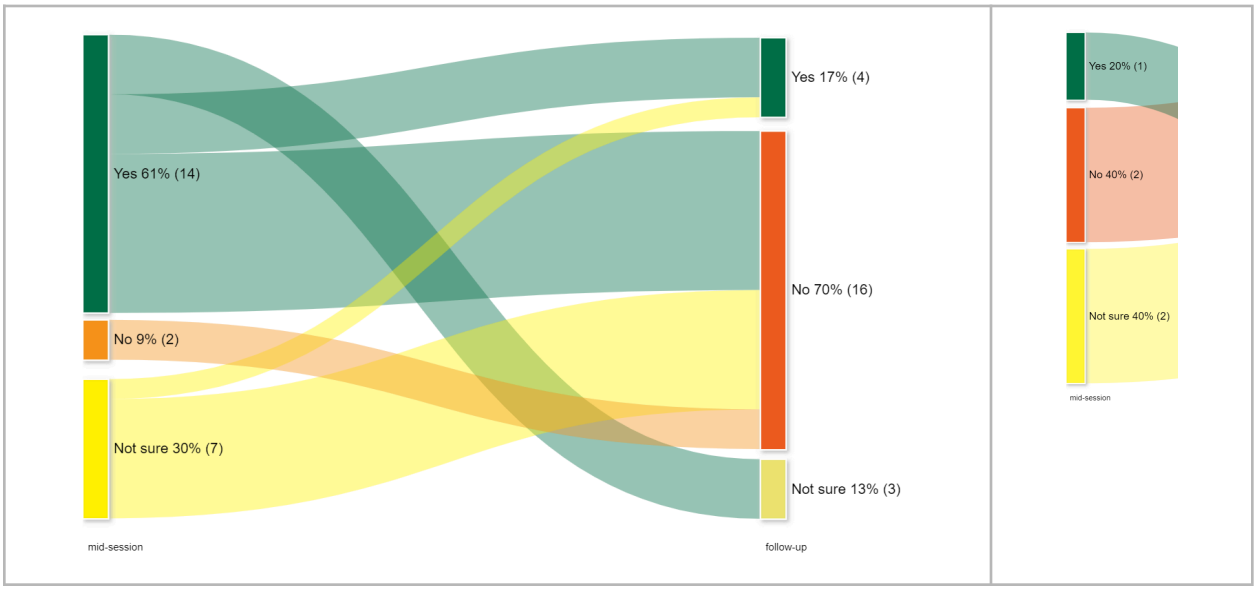
Again there was commitment to taking action after using *(re)imaginator* but at the two-week follow up only 17% of the 23 respondents to the follow-up survey reported that they "had taken action and adopted new ways of action" (Figure RQ3.2-7). Only 21% (3 of 14 participants) who said they would take action reported that they had done so in 2 weeks; 57% had not. One participant from the implementing organization who reported taking action shared,

> I have tried to figure out a way to adopt new ways of doing things and acting accordingly and I have taken action and adopted how I do things..

If non-respondents had completed the follow-up survey, there would likely be fewer percent who would have taken action. At the mid-session survey, 53% (15 of 28 participants) reported that they would take action, a slightly lower figure than the 61% of respondents to the follow-up survey; indicating a difference between respondents and non respondents that would likely reduce their self-reported adoption of new ways of acting.

Figure RQ3.2-7. Comparison of individual response changes between mid-session and follow-up surveys for Stage 10 (taken action and adopted new ways of acting)

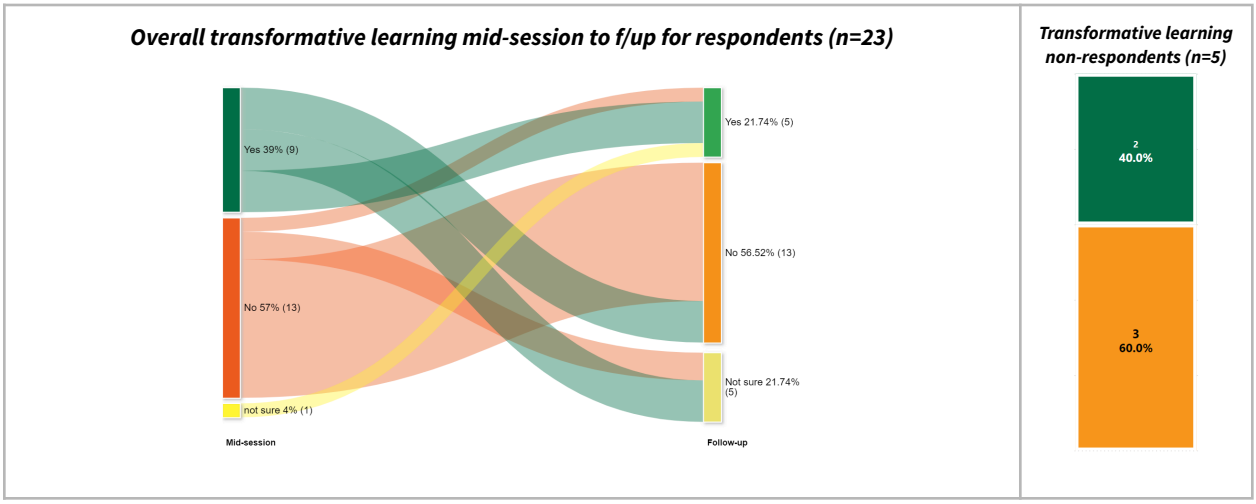
Stage 10 mid-session to f/up for respondents (n=23)	***Stage 10 non-respondents (n=5)***



Overall transformative learning

The last part of the LAS is a general question asking participants whether their "values, beliefs, opinions or expectations changed" over time based on using the (re)imaginator. The majority (57%) reported no change at the mid-session survey and this stayed steady at the follow-up, again for the 23 participants who completed the follow-up survey. There was a decrease in those reporting 'yes' between mid-sesion and follow-up, moving from 39% to 5%.

Figure RQ3.2-8. Comparison of individual response changes between mid-session and follow-up surveys for transformative learning



Seeing these results, however, the qualitative richness comes into play where many mentioned that even if perspectives do not change the practice of reflection was still valuable. Many participants shared this same sentiment. As one noted:

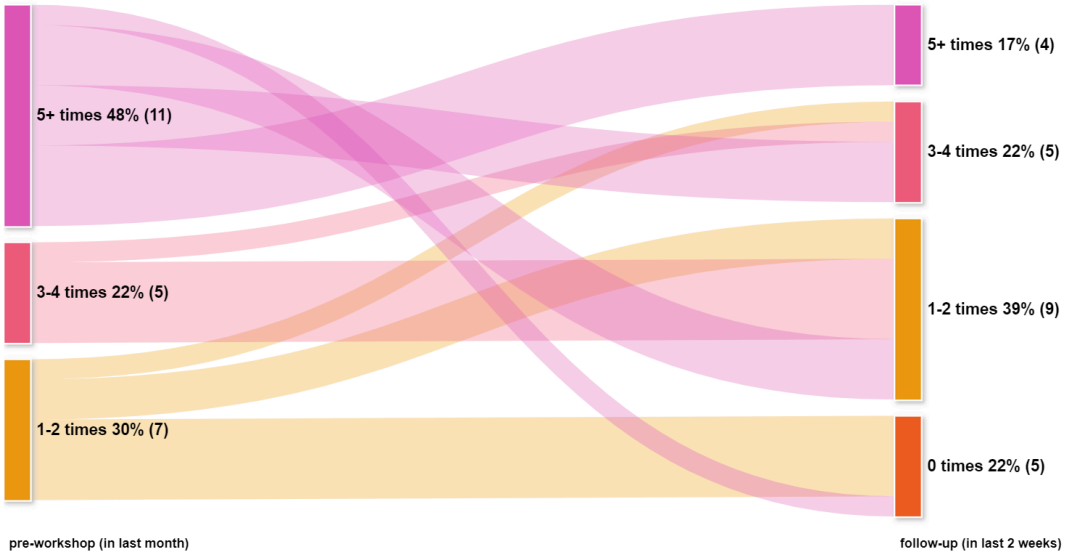
> the individual prompts in a way of… making quite explicit and… really like forcing me to get words down on paper… to make concrete some of the reflections about components of a project…. I think that these are incredibly valuable exercises to do… So I guess I wouldn't consider reimaginator of a failure if it didn't force change in perspectives, because there's so much value that comes out of it.
>
> Even if you keep your same perspective, but you're just really forced to kind of make concrete how you're going to make change or implement the perspective that you have. it's very, it's very easy to have a perspective.. but the translation of a perspective and approach to action in project design, leadership, creation, dissemination, all of that is, is really the true test of how the perspective manifests itself.

RQ 3.3 | How do participants describe their reflection practices after the workshop?

Personal Reflection Practices

For the 23 participants who responded to the follow-up survey, there was no trend in post-workshop uptick in personal reflection frequency at an individual level or when disaggregated by organizations (Figure RQ 3.3 -1). Two participants reported they were on holiday and another was on clinical service, perhaps leading to a decrease in frequency of reflection but these differences would be unlikely to impact overall trends. Note that baseline was reported as frequency of reflection in the past month, while the two-week follow-up naturally captured frequency at follow-up. Thus a follow-up at one month may show steady patterns of reflection, but at two weeks there is no trend for an increase in reflection practices.

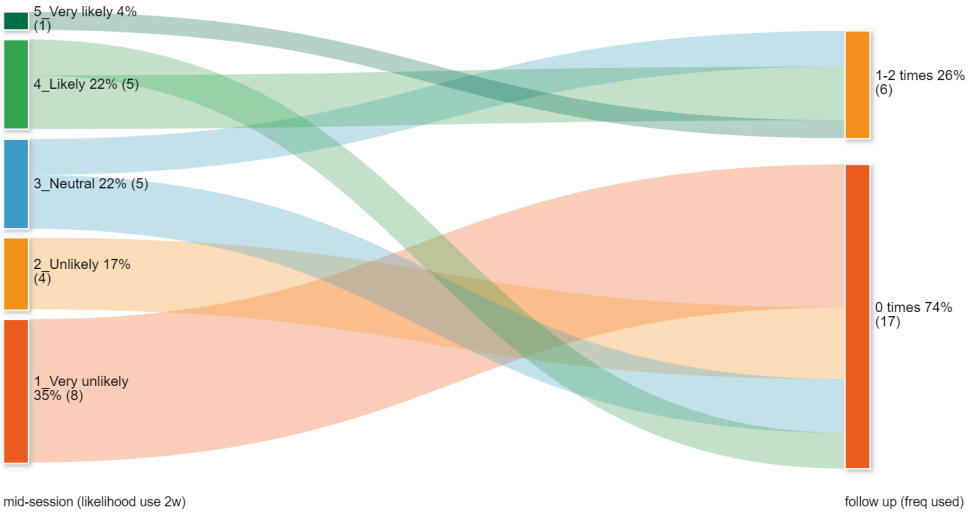
Figure RQ3.3 -1. Frequency of reflection from pre-workshop and at follow-up (n=23 participants)



Using and sharing (re)imaginator

Of the 23 respondents who completed the follow-up survey, 26%, reported using *(re)imaginator* 1 to 2 times in the last two weeks with 74% reporting zero use (Figure RQ3.3-2). This is somewhat on par with the mid-session survey, where 21% of the 30 participants reported that they were 'likely' or' very likely' to use the *(re)imaginator* in the next two weeks. Three who reported they were 'likely' to use, did not actually use. No qualitative data was collected about the reasons for not using *(re)imaginator* though general barriers to reflection are described below.

Figure RQ3.3-2. Mid-session likelihood of using (re)imaginator in next two weeks versus frequency of (re)imaginator use at 2 weeks (n=28)



Similar trends were seen for sharing *(re)imaginator* with colleagues, while 11 of the 23 respondents reported being 'likely' or 'very likely' to share the tool, only 3 had done so at follow-up (3% of all participants).

Figure RQ3.3-3. Mid-session likelihood of sharing (re)imaginator with colleagues versus those who had shared

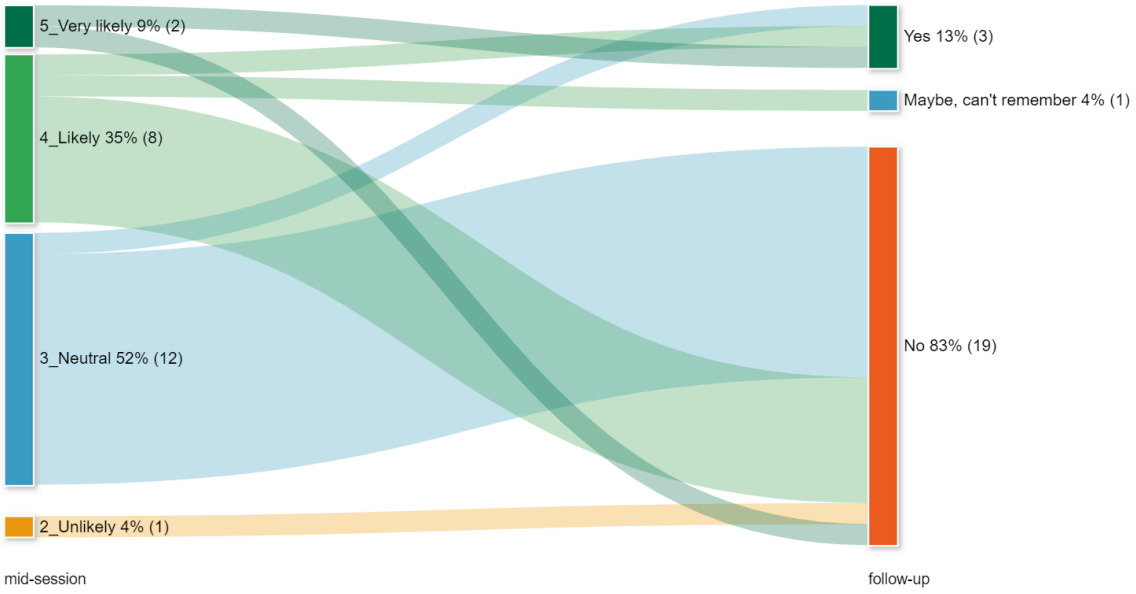
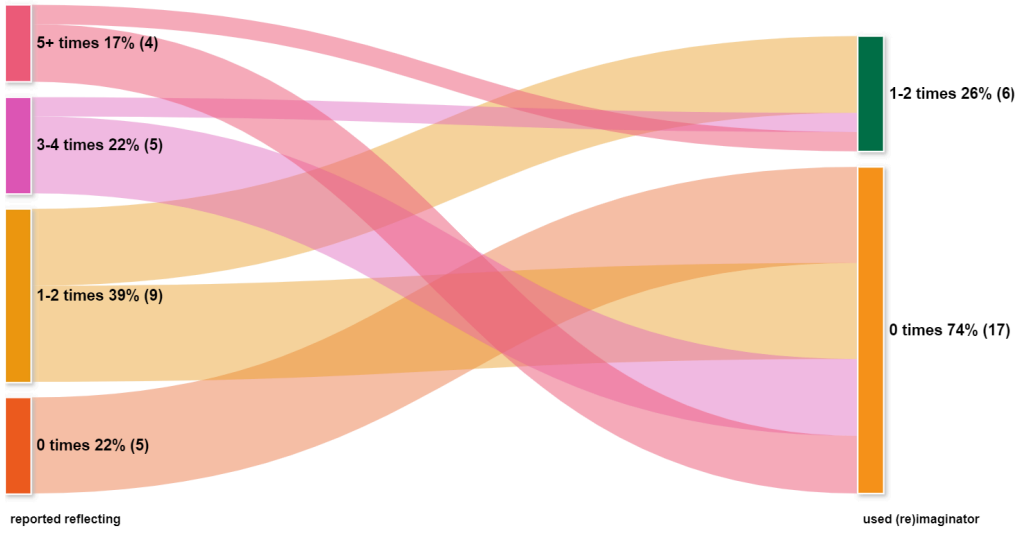


Figure RQ3.3-4. Participant's frequency of reflection and use of (re)imaginator at two-week follow-up



Only 33% (6 of 18) of participants who reported reflecting in the two-week follow-up period said they used *(re)imaginator* (Figure RQ3.4-1). There was consistency between those who reported reflection and who used the tool; meaning there were no reports of using the tool if they also shared that they had *not* reflected.

Barriers to reflection

Participants noted the following barriers to personal reflection, echoing some of the key conditions for reflection from Fleck and Fitzpatrick including time and the right environment (Section 3.2.3) [61]. The major themes in barriers were:

- **Time and other work priorities:** twelve participants cited time and need to focus on other work priorities as the biggest barrier to their personal reflection practice. As one academic described, "Being always too busy to think." While several mentioned urgent deadlines with hectic schedules.
- **No barriers to reflection**: seven participants mentioned no barriers to reflection. These participants were from implementing, implementing/research, and academic organizations, and had varied frequency of reflection at follow-up. In other words, there were no trends; those who shared they had no barriers to reflection.
- **Vacation or clinical service**: Three participants cited their vacation or clinical service as taking them out of their routine global health work, and being their primary barrier for reflection.
- **Environment:** one participant at the implementing/research organization mentioned physical proximity as a barrier to reflection, explaining: "It's hard to make space for this, especially when we're not physically proximate to each other." Another from this same organization mentioned the lack of resources dedicated towards reflection that limited their ability to reflect.

Reflection topics

These reflection topics underscore a commitment to project improvement, with emphasis on considering how to design programs that fit current needs, reflecting on the influence of various actors in global health, and questioning who sets the priorities in the field.

Personal role and impact: In terms of what they reflected on, 6 of 23 respondents mentioned that they thought about their role and the impact they are making in their field. Several academics questioned the impact of their work, posing questions like: would the work, "harm, or good, (or nothing)?," and questioning whether they should spend their time in another way. One academic also shared that they feel they are not meeting their professional expectations, explaining that there are "urgent needs in the world that my work is not addressing and the cognitive dissonance I feel in working so hard while those needs go unmet." While yet another academic participant similarly shared that their biggest reflection question is:

> whether what I am doing makes a positive difference at all. It seems that I have made some changes but the system also seems to change in a counter way. So I have more questions today than solutions

Finally one academic reflected on more logistics of their "how and whether I should react during some meetings" and whom they invite to meetings that they organize. A participant from a funding organization ran scenarios and reflected on how their actions may impact how they "play out."

Improving systems and project alignment: Participants emphasized reflecting to enhance projects and systems and support decision-making. Two participants noted a desire to redesign projects to better align with client perspectives and to understand "what they would like us to do differently." Three participants from implementing organizations noted reflecting on power dynamics. As one of these participants described, "What I have been reflecting on recently is the level of advocacy different actors have in global health and how they choose to act on that to reproduce or disrupt existing power dynamics, especially between funders and implementers."

Research equity: Two from the implementing/research organization and one academic reflected on equitable research, conference participation and authorship. One North American woman considered "how to support the growth of all researchers."

> My reflection in the past two weeks focused on sharing the results of my work…. [including] relevance of result sharing, as well as participation to conferences to learn from others, to network and to build new collaboration.

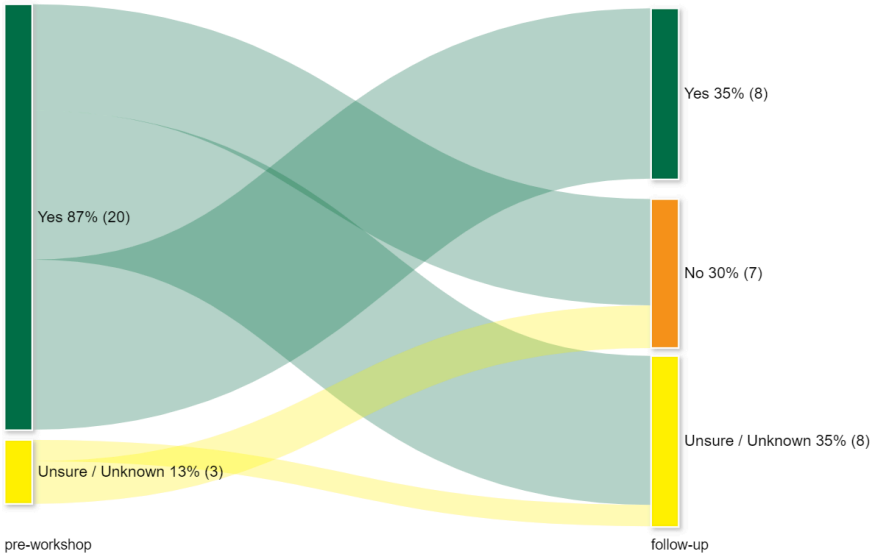
Summary of Change in Personal Reflection Practices

While there was no obvious uptick in the frequency of reflection at follow-up, more participants shared that they were reflecting about their specific roles and impact. In the pre-workshop survey, a few participants reflected on power dynamics and their roles, but at follow-up there appears to be more concentration on their individual contributions, rather than critiques on the field or programming in general. Participants continued to emphasize that they reflected on project impacts and design, and similarly two participants specifically incorporated reflection on how to generate more client-centric programming. While these differences in reflection topics cannot be causally attributed to *(re)imaginator* and the Design Workshop, they hint at the possibility of *(re)imaginator* planting a seed encouraging more reflection on personal role in projects.

Organizational Reflection Practices

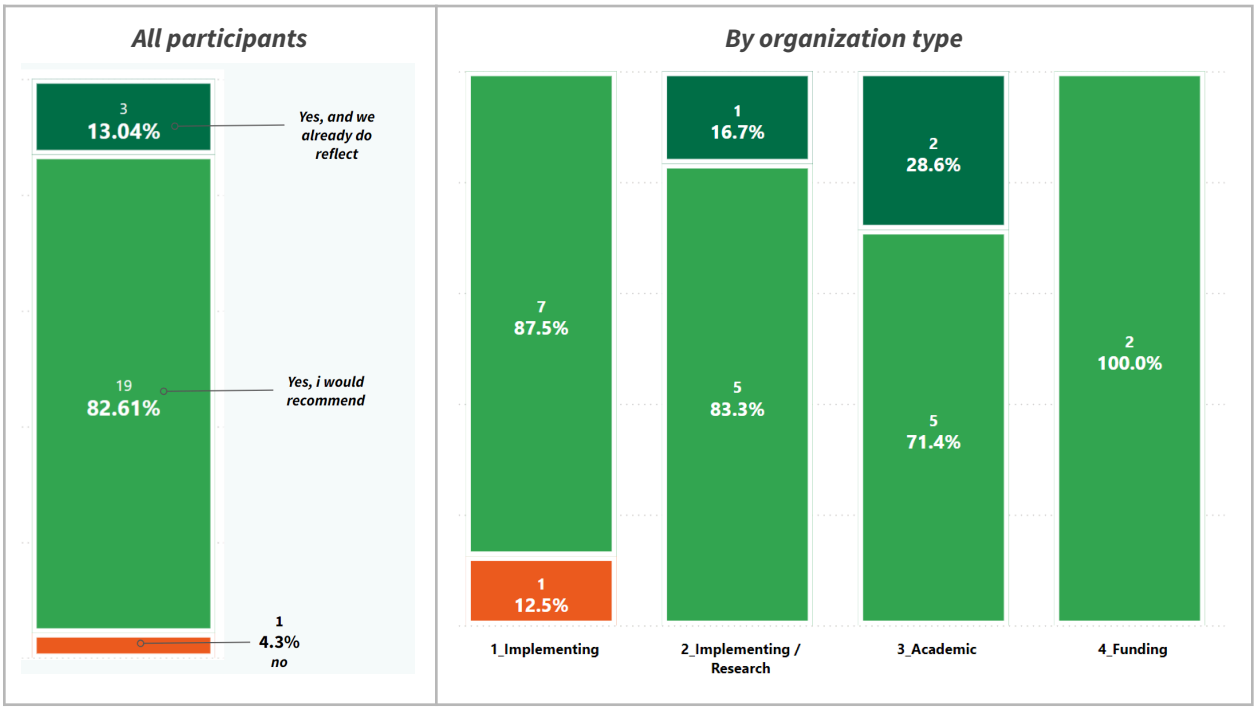
At follow-up 35% of the 23 respondents reported that their organization reflected on its global health practices, compared with 87% percent at baseline (Figure RQ3.3-5). Five of the 20 participants changed from 'yes' to 'no' while 7 moved to 'unsure.'

Figure RQ3.3-5. Participant responses on organizational reflection on global health practices: pre-workshop vs. follow-up survey.



Of the 23 participants, 96% would recommend that their organization integrates reflection practices in their organization (Figure RQ3.3-6). Overall 3 participants wrote that their organization had already integrated reflection practices, showing a reduction from the 8 participants who shared that their organization reflected on its work at follow-up (Figure RQ3.3-6). Participants cited that reflection has "low overhead" and the potential to strengthen cohesion amongst staff.

Figure RQ3.3-6. Would you recommend that your organization integrates reflection practices?



Other themes cited for why they would recommend reflection is that it would promote equity to ensure their work is "progressively moving towards more equitable, decolonized global health research & practice." Reflection was reported by one participant as the “first step to change,” while another noted that the practice would “help us evaluate how we start some projects, whether we should start some projects and how we interact within the organization and with our partners.” As another participant described,

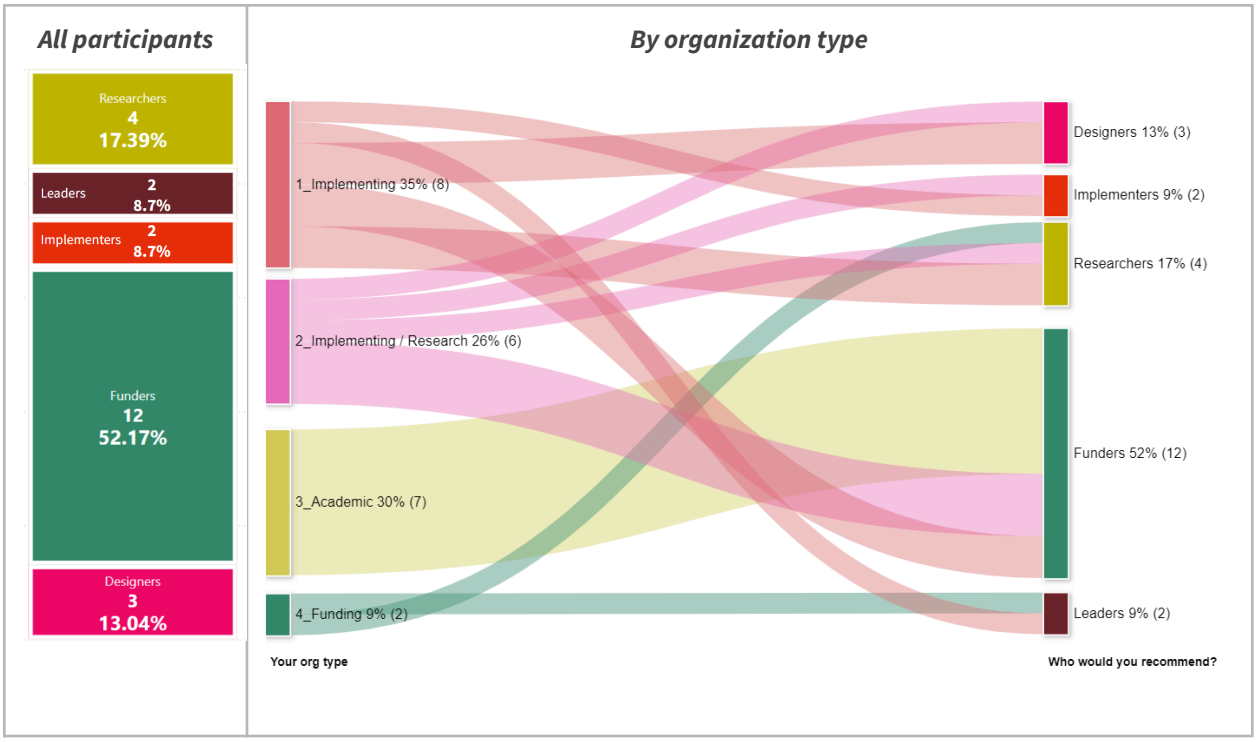
> … [reflection] helps us consider different perspectives on how and why we produce work, how often it should be course-corrected, and how valuable and relevant it continues to be.

Thus, reflection could improve project effectiveness by allowing consideration of new vantage points and support changes. The idea of supporting change was echoed by many participants. It may also help identify "barriers in implementing previous projects" and "forecast possible challenges" in future ones. Finally, one participant recommended reflection,

> …because we tend to feel too comfortable with status quo and not realizing that we are not making the world a better place after all, contrary to what we believe

The one participant from an implementing organization who said ‘no’ explained, “it's beyond organization's scope” though they did not elaborate further.

Figure RQ3.3-7. If you could choose only ONE group to reflect more on their global health work, who would it be?



Over half of participants recommended that they would recommend funders as the major organization to reflect, and 58% (7) of these 12 participants were part of an academic organization. *All* academics selected funders as the main group they would recommend, with one noting,

> I think [funders] tend to be the most agenda-driven and often hold outdated ideas about global health. They are also the major reason why researchers, implementers, etc struggle to change our practices. Funding incentives matter.

The remaining 42% were from the implementing organizations who had very similar reasoning around agenda-setting. As one participant described this,

> Funders have so much say in establishing priorities, perhaps even more than governments. Their priorities can shape how the work is done

Only two funders responded to the follow-up survey, so these two votes are a hint at what the two of the six participants from the funding organization may think. The person who chose 'leaders who work in governments or key institutions' had one reason why, "Influence." The other participant from the funding organization chose researchers, stating that they "hold a lot of power in generating global health evidence. Incentive structures, topic areas, etc are born out of this group."

Participants from research/implementing and the implementing organization were the only two groups who selected their representative roles as having the influence. Some shared that it is the designers who "should come up with projects that have impact on global health" with another saying they are the "brains behind the interventions." Another participant from the implementing organization highlighted that *implementers* would be their top selection, describing:

> I think that there still a huge gap of knowledge on implementers global health work in my country. So they should have reflection on that in order to improve their work in general.

RQ 3.4 | What design features may help global health practitioners critically reflect and embed reflection into practice?

Throughout the workshop discussions and surveys, participants shared many ideas for how to design for reflection and better embed reflection into practice. Their experience using *(re)imaginator* seemed to provide common ground for critique and discussion, and seemingly supported the participants to generate the following desired features.

Desired design features summary

#1: Support practitioners in curating a set of reflection questions: Participants emphasized the desire for a more focused and guided approach to reflection, both in that the tool would have clear instructions for the reason why participants should reflect and produce a more customized set of reflection questions based on their needs. This could involve:

- **Theme-specific question sets:** Develop pre-built question sets focused on specific themes relevant to global health practice (e.g., project design, cultural considerations, monitoring & evaluation).
- **Share the library of all question prompts**: allow users to select from the entire set, potentially based on some filters or guidance so they can curate their own reflection journey. An even more tailored approach that one participant recommended would be a preliminary assessment tool that recommends questions based on user-identified areas for reflection.
- **Share examples of reflection**

#2 More guidance moving from reflection to reflecting on action: Participants also strongly recommended that there were more prompts to articulate concrete action steps after reflecting. These "Action-Oriented Prompts" would bridge the gap between thoughtful analysis and taking tangible steps for improvement. Participants mentioned that it would be helpful to have a pop-up of others who responded to the same question and see any resources or ideas they had to take action. Several mentioned that when they selected on *(re)imaginator* whether the reflection they had just written would provoke action, they wished the system would have asked them to elaborate on what they would do or why it would not.

#3 Inclusive Design: Participants highlighted the importance of creating a tool that is inclusive and accessible to a global audience. This means avoiding jargon, Western-centric terms, and any language that could be perceived as making assumptions about a user's existing reflection practices. Second, the tool's tone should be more neutral and avoid leading questions. The participant feedback about "loaded assumptions" suggests some prompts might be interpreted as judgmental. A neutral tone would empower users to engage in self-directed reflection without feeling pressured to conform to a specific viewpoint.

Beyond design: recommendations for embedding reflection into practice

Fostering a safe culture of reflection that leads to change: Participants emphasize the desire for a broader shift in organizational culture. Several suggested the importance of organizational leadership to be more open to change in general and, specifically, to changing practices. As one academic described the need for, “pushing the

leadership team to be more open to change and taking risks," where another described that " reflection needs to integrate with ongoing conversations about our department's long term growth strategy and vision." Participants noted that reflection without changing practice made it a useless exercise

> The thing I want to add… uh change… because for me, when we reflect and change doesn't happen, then it's pointless. We can have the best tools, we can have the best intentions, but after reflection, we'll all walk out and continue our business as usual. That is… that's the change for me is a very critical part of uh a positive reflection… committed to at least doing… having changing things.

Recommendations on gradual integration of reflection into existing processes: Academic and implementing organizations highlighted the importance of embedding reflection into ongoing activities and established processes like staff meetings, staff retreats, and annual work planning. As one academic suggested a specific way to to integrate reflection:

> I'm trying to think of… like… teams that we work with where, you know, it feels like so much is rushed, but it would be really important to add this in. And I wonder if adding in an additional time for reflection that's different from our, you know, packed weekly study call… where we're trying to add it in as the agenda item right before any other business… you know, would be really helpful to have these like spaces to…think and reflect together.

Other participants echoed the need to consider factors like team dynamics and workloads when aligning reflection with existing workflows. Participants also thought reflection could be better integrated into touchpoints of project reviews, particularly at the start of projects, including when writing grant proposals and beginning to implement. While regular reflection sessions may be valuable, participants also note that adding reflection in response to significant events (positive or negative) may be beneficial. Academics and researchers also discussed the importance of reflection when writing manuscripts and disseminating findings. Several mentioned that they have a process to reflect at this stage.

One academic mentioned the importance of their existing reflection group as supporting their practice. While participants recognized the need to integrate reflection beyond traditional meetings, this theme underscores the desire for a practical approach that leverages existing structures. Additionally, participants noted that use of reflection could be integrated into performance and "merit-based" reviews for career advancement.

Challenges of integrating reflection into funding organizations: participants from the funding organization expressed the most difficulty integrating reflection into practice due to the effort required to modify established and complex grant-making processes from proposal development to review to final approval. As a senior-level participant described:

> Well, so, I mean, the challenge is, is that if um funding organizations such as {names org} have a pretty extensive process for how you create a concept, how you turn that into a request for proposal, how you review those proposals, how you get approvals and, and how it leads to actual funding. There we do have some tools baked into that process [like the] gender integration marker, for example, but it's a very hard thing to do….

> I think if you're trying to take the route of a large funding organization using this tool, I actually think that that would be very difficult because I think um it would be very difficult for them to link into existing processes, the effort to change a process in [our funding organization]... um…. is quite… um quite herculean. So I think maybe you're thinking of the wrong audience. This is not to say that there wouldn't perhaps be individual practitioners or programs, you know,...who might find, “oh, this is helpful for me

While formal adoption might be challenging, the same participant suggests the tool might be better suited for individual program officers during specific stages. They noted that they may particularly benefit from the tool if reflection questions aligned with specific funding touchpoints like funding allocation, grantee selection, and ensuring grant equity

> This is not to say that there wouldn't perhaps be individual practitioners or programs, you know, the program officers who might find, “oh, this is helpful for me.” You know… there are times of the year where we commonly come up with concepts and share them with a group and figure out what we're gonna fund for the year. So I think sort of on the individual contributor level, it would probably be… potentially be an initial audience. I think actually trying to get it into a funding organization, at least taking this organization as an example, that would be very difficult.

Interestingly the implementing partners also thought reflection could be better integrated into touchpoints of project reviews, particularly at the start of projects including grant proposals and when they begin to implement the project. One academic specifically had an idea that reflection could be integrated into proposal writing. As they described “as you're writing the proposal and the grant, you know, is there also a reflection section that is, it's part of the prep package.”

Empowering, not blaming individuals for creating the ideal future: Several participants noted the importance of not blaming or shaming individuals for their reflections, describing that systematic change goes beyond the individual. One participant explained that reflection was “risky to do this really honestly” citing how “alienating it can be for me personally. So I'm gonna kind of infer that for others.” Another person described,

> And I think that part of that is also making sure that reflection isn't disempowering of people when a lot of the issues are systemic. Um not to shift blame to you know, from individuals to systems too much… but, you know, uh a lot of us in academia are operating under sort of traditional structures like, you know, we have to be PIs on grants, and first or senior authors on papers and all this sort of stuff that creates incentive structures that makes it really hard… to create the kind of change we want to see.

To achieve this, many participants mentioned the need for groups and organizations to create psychological safety citing it as an essential ingredient for fostering candid conversations within teams. Many cited that face-to-face conversations were important for this candor, and several noted that their teammates being spread globally made this difficult.

Several participants pointed out that existing power structures can discourage open and honest communication. They cited many risks, including losing funding, projects, promotions etc. This highlights the need for a culture of

safety as the foundation for candid reflection, where the negative consequences should be minimized. As one participant described,

> I'm also thinking about the power dynamics that are present within those teams would make it really challenging to have these conversations candidly, because a lot of people's…. like, people could feel like, “oh if I say something critical, will my contract get renewed?” You know, there's like real, not psychological safety, but also just like material safety of being critical about how things are going and how they could get better. So I… I would love to hear, like, ideas of or ideas from tools, of how to overcome some of those issues. Because I think that the power trust and safety dynamics are a little bit harder for me to engage

Interestingly, one participant cited the workshop Activity 2— where participants were teleported into the future to share what the ideal future looked like— as a potential way to overcome that alienation. They shared that by by thinking about desired future as a group, rather than singling out an individual’s role, the exercise of creating an “ideal future really encourages everyone to feel sort of psychological safety… uh… in sharing and reflecting honestly.”

This need for creating safety also extended beyond their own organizations, and emphasized the need to reflect and acknowledge power differentials and need for safety with their global health partners. As an academic participant described:

> It's just I'm having flashbacks back to the projects that… we run with the different partners…. if *we* in this room—who are the managers… {gestures air quotes} quote managers, PIs, project leads— feel that way…. God, I feel like the feeling from our partners is quadruple that. The ability for them to… walk in the room, work with us, and feel like it's an environment where they feel comfortable expressing themselves… that they feel trust is there and they feel that there will not be retaliation. So I think yes, the reflection is important for us here. But I think it {whistles for emphasis}, *we* need to take it even a step further. Also to think about, wow, how do our partners… feel regarding those issues?