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Minimal computing in refugee education in Uganda: economies of digital use and non-use, and the right constraints

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ABSTRACT

Using the Foundations for All (FFA) project as a frame for broader discussions of minimal computing, this paper expores education for displaced populations in Uganda and the role technology has in that education. FFA (2018–2022) was a collaboration designed to develop and implement a blended bridging programme for refugee students to participate in universities in Uganda. This paper explores the role that digital technologies had to play in this project in imagining educational futures predicated on minimalism and the judicious use and non-use of technology. When used, the emphasis on available technology was dominant, as was a pedagogical emphasis on psychosocial support and social justice. Technology seen in this approach is best imagined as facilitating opportunities for contact and care, rather than as the driver of the educational enterprise. Such an approach runs counter to many of the discourses around digital development.

Minimal computing and forced displacement in Uganda

Refugees are legally defined as 'someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion' (UNHCR 1951). By the end of 2023, 117.3 million people were forcibly displaced, either as refugees, internally displaced persons, or asylum seekers (UNHCR 2024a). As most refugees are hosted by low- and middle-income countries, this places great strain on existing services in these host countries. Full assimilation into host societies is often seen as a preferable mechanism for alleviating this strain. Education, and in particular higher education, is seen as a necessary driver for national assimilation and the use of technology to satisfy that education is increasingly present.

Minimal computing as presented in this paper is situated amidst this landscape of forced displacement, and in particular in Uganda. As of 2024, Uganda hosts the most refugees in Sub-Saharan Africa at 1,702,278, mainly from South Sudan, the Democratic Republic of Congo (DRC) and Burundi (UNHCR 2024b). The majority of refugees (92%) live in refugee settlements in Northern and Western regions (ACAPS 2023), areas that are often poorly served with existing infrastructure: educational, technological, or otherwise.

Further, access to higher education for refugees is problematic due to a range of interrelated and compounding barriers: language, social norms, economic, and administrative (discussed in Nambi, Najjuma, and Gallagher 2023; Najjuma, Gallagher, and Nambi 2022 – see Table 1 below for details on the specific case of FFA). Increasingly and problematically, higher education inclusion is being expressed in ways that make technology an interdependent variable in any inclusion effort (Gallagher, Najjuma, and Nambi 2023). This is in part fueled by crises such as COVID-19 and the decidedly uneven ways in which the pandemic impacted those able to access education through digital technologies (Kaguhangire-Barifaijo et al. 2023; Najjuma, Gallagher, and Nambi 2022; Nambi, Najjuma, and Gallagher 2023).

However, its roots are deeper than this recent crisis and are, in part, accelerated by Uganda's adherence to the scaled educational targets of international frameworks such as the Sustainable Development Goals (SDGs). Such targets, and the increasing discursive focus on the adoption of digital technologies to meet them, are problematic environmentally and in the potential erosion of local educational autonomy (Gallagher 2019). Yet they frame, at least partly, the discussion of minimal computing as presented in this paper.

Digital use for refugee populations is informed by their status and overall visibility in Ugandan society both legally and otherwise, and efforts at further inclusion are often expressed in terms of removing barriers to that use. These include efforts at reducing prohibitive mobile data costs (Njoya 2022), providing learning centres equipped with internet connectivity (Ssimbwa, Solomon, and Mawa 2023), and in some rare cases, the development of community-run internet networks (Bidwell 2021). As home connectivity in Uganda is 13% for urban households and 3% for rural households (NITA 2022), which is where most refugee settlements are located, such measures are appropriate through the discursive framing of educational inclusion seen as an increasingly digital medium.

As such, this paper explores minimal computing in refugee educational contexts in Uganda set against the broader sociotechnical discourses that increasingly permeate educational development for marginalised populations, discourses generally predicated on scale, efficiency, and employability. The imaginaries around the role of digital technologies with refugee populations, particularly around educational inclusion 'tend to reflect a broader neoliberal project that envisions a retreat of the welfare state and the increased marketisation of humanitarianism' (Alencar and Camargo 2023, 23). The technology effectively stands as a surrogate for that retreating welfare state with its implicit discursive emphasis on resiliency and self-efficacy as the means towards educational assimilation. Discursively in deference to scale, dedicated blended instruction to smaller student groups gives way to scaled self-study in massive online spaces. This is the context that minimal computing will conceptually frame in this paper.

Minimal computing as a conceptual frame

Emerging from the digital humanities, minimal computing is digital work undertaken in the context of constraints. As Risam and Gil (2022) note, these constraints might include a 'lack of access to

Table 1. Student situation.

	Kampala (n = 16)		Kiryandongo (n = 17)	
	mean	SD	mean	SD
Number of dependants	2.56	2.06	6.33	3.14
Time to go to the learning centre (in minutes)	55.07	51.73	61.25	52.15
Regularly skipped meals last week	0.71	0.47	0.35	0.49
Never has electricity home	0.00	0.00	0.71	0.47
Always has electricity home	0.53	0.51	0.12	0.33
Owns a smartphone	0.69	0.48	0.83	0.39
Self efficacy (self confidence) score*	2.05	0.33	2.28	0.54

Source: baseline survey except number of dependents, time to go to learning centre and smartphone ownership. *mean score of 10 indicators of self efficacy, ranging from 0 – no confidence at all to 3 – very confident. Self efficacy is one measure of self belief that the individual can achieve their goals.

hardware or software, network capacity, technical education, or even a reliable power grid' (1–2) and an organisational ethos around using only what is required or necessary in response to those constraints. However, this might also suggest an emphasis on the 'right' constraints, such as usefulness (Caria 2016), contextual relevance, educational impact, or affordability. Constraints needn't be presented as deficits but rather as available assets (Risam and Gil 2022) for use in a particular context. Gil (2015) in this respect focuses on necessity: 'we prefer to (not) define minimal computing around the question "What do we need?" If we do so, our orientations vis-a-vis ease of use, ease of creation, increased access and reductions in computing – and by extension, electricity – become clearer' (Gil 2015, n.p.).

Conceptually, minimal computing resists an association of 'innovation', digital or otherwise, with newness, scale, or scope (Risam and Gil 2022). As such, it challenges many of the digital discourses that predicate development on scaled responses to seemingly intractable challenges, responses dependent on greater acquisitions of technology. More broadly, it also critically engages with, or allows for the critical engagement with 'postcolonial critiques of globalization and technology, modeling responsiveness to issues of access, wealth, and uneven development' (Risam 2019, 43). All of these issues are easily found in efforts at educational inclusion, particularly for marginalised groups and as such, minimal computing provides conceptual utility in their analysis.

The four questions of minimal computing as put forth by Risam and Gil (2022) are instructive in this respect, both in terms of defining the conceptual framework we employed in this paper and suggesting the different contexts in which it may be applied: 1: What do we need? 2: What do we have? 3: What do we prioritise? 4: What are we willing to give up? These questions in particular serve to provide a conceptual framework that the discussion in this paper largely adheres to.

Yet this emphasis on minimal computing, whether in response to constraint or a more assertive engagement with the questions of minimal computing, carries with it questions of power and the asymmetries associated with that power, particularly prevalent when working with marginalised populations. As Boyles and Boyles Petersen (2022) note, such questions force us to revisit the minimal computing question of 'what do we need?' and potentially reframe that question to 'center not only technological tangibles but also human(e) requirements for effective and ethical engagement' (31). This is echoed in Pomputius's (2020) distinction between minimal computing (and its discursive emphasis on technology and its limits) and compassionate commuting (with its emphasis on the individual and their needs).

Yet we note the discursive significance of minimal computing decentering the human as the object of study, particularly for education, for two reasons: first, it provides a mechanism for both critiquing positions of innovation defined around newness, scale, or scope (Risam and Gil 2022) that inevitably stimulates greater efforts at technological acquisition. Second, it aligns minimal computing with a large body of critical digital education research that resists an anthropocentric emphasis consistent with humanistic approaches to education (Bayne and Jandrić 2017).

How we use it in this paper

In this paper, we conceptualise minimal computing explicitly through the four questions of Risam and Gil (2022). A focus on minimal computing offers us a means of loosening the discursive grip of educational development based on the acquisition of greater and greater amounts of technology. It questions innovation as something predicated on newness, scale, or scope, as Risam and Gil (2022) suggest. It embraces constraints as potential design imperatives. It is, or can be, a more environmentally appropriate model of digital education for any context as it resists innovation as defined by scale or newness. In the context of forced displacement, minimal computing is instructive in its emphasis on community input towards 'maximal connection', whether that be 'increased accountability, tangibility, and locality' (Wythoff 2022). This notion of 'maximal connection' is defined in the context of this paper as an appropriate use and non-use of technology and curricular emphasis on contact and care.

For the context of forced displacement explored in this paper, minimalism is the norm as technologies, pedagogies, policies, practices, and infrastructural constraints are navigated, and assembled into fluid and at times often sophisticated ensembles through a range of cultural practices. Risam even said as much when defining minimal computing: 'a range of cultural practices that privilege making do with available materials to engage in creative problem-solving and innovation' (Risam 2018, 43). What makes the context of forced displacement dynamic in relation to minimal computing is the nature of the constraints themselves and the diversity of the group we call the forcibly displaced (and in turn, the wide array of cultural practices being drawn on to 'make do').

We also incorporate constraints explicitly into the framework guiding the discussion in this paper, particularly by drawing an emphasis on the 'right' constraints, such as usefulness (Caria 2016), contextual relevance, educational impact, or affordability. As suggested by Risam and Gil (2022), constraints aren't exclusively deficits but rather available assets for use in a particular educational activity. Practically in this respect, we echo the position of minimal computing found in Chauhan et al. (2023), one 'that emphasizes accessibility, creativity, reproducibility, localization, reuse, and environmental impact' (p.9). We acknowledge that minimal computing provides a lens to critically interrogate the circular economies of e-waste (Pickren 2014) being in small part engendered by educational inclusion defined through digital means, to begin to question 'how to repurpose existing technologies to reduce e-waste and engage with obsolescence in generative ways' (Wythoff 2022, 2). How these aspects of minimal computing manifest in forced displacement contexts is discussed further in this paper.

Foundations for All

Using the Foundations for All (FFA) project as a frame for broader discussions of minimal computing, this paper sets out to think through inclusivity for displaced populations in Uganda with and without edtech. FFA (2018–2022) was a collaboration between the Refugee Law Project (RLP) at Makerere University, the American University of Beirut, and the University of Edinburgh designed to develop and implement a blended bridging programme for refugee students to access and succeed in Ugandan higher education. The 30-week curriculum explicitly emphasised psychosocial support both as a taught subject and pedagogically woven throughout the student experience. Further taught subjects included English, Maths, Study Skills, and Digital Skills. The curriculum was designed collaboratively amongst the three institutions. The curriculum was bound to outcomes related specifically to higher education. As such, the intended main outcome would be admission to university, through Makerere University's Mature Age Entry Exam. Due to the non-traditional nature of most students participating in FFA, this exam represented the only viable means to access higher education (Akello et al. 2023). FFA was taught by dedicated teachers from RLP in 2021–40 students.

Two purpose-built learning centres were constructed in Kampala and the Kiryandongo Refugee Settlement and equipped with laptops, connectivity, and electricity (Nanyunja et al. 2022) to support this instruction. Edtech used in this project included Kolibri, an openly available and connectivity-sensitive Learning Management System (Kolibri), WhatsApp, and mobile devices (Nanyunja et al. 2022). These were used to supplement the analogue technologies such as paper copies of course materials, pens, and notebooks, that supported face-to-face instruction at the learning centres. Each learning centre had 20 students and five tutors drawn from the team at RLP. Two maths tutors were hired from outside the RLP team to support the Mathematics component of the FFA curriculum. The learning centres were open all day: in the morning they are used for FFA classes, but they remained open in the afternoons to provide students with an opportunity for independent study using the laptops. On Fridays, when there were no classes, the learning centres were open from 9 to 4 pm for students to work on their assignments independently.

The 40 students that ultimately represented the first cohort were selected through a process that began with adverts circulating on social media and physically posted in strategic places usually accessed by both refugees and hosts in Kampala and Kiryandongo. 116 interested learners applied (58 in both Kampala and Kiryandongo) and 73 were shortlisted for interviews (39 in Kampala, 34 in Kiryandongo). A total of 40 learners were finally selected based on a range of criteria: availability to attend FFA as travel to the learning centres is time consuming and subject to interruptions, existing language ability, and stated ambitions in relation to higher education. The students were 41% female (the same proportion in both sites). Their countries of origin included Burundi (2.5%), DR Congo (22.5%), Rwanda (2.5%), Somalia (10%), Sudan (7.5%) and South Sudan (35%). It is important to note that the FFA programme was only available to those who had successfully completed RLP's English for Adults programme, thus ensuring a baseline of language proficiency. Aligned with FFA's commitment to also include the local community, and the Ugandan government's stipulation that programmes for refugees include a certain proportion of Ugandan citizens, 20% of the students were Ugandans from disadvantaged backgrounds.

Only 17% of the students had a high school certificate (and another 14% lost it during the forced displacement period). At least 12 different native languages were represented in this cohort. In both sites, though more so in Kiryandongo, the students also index well above the national average on disability indicators. Our baseline survey and interviews with the students revealed that they are highly driven and motivated. Their answers showed their strong belief that they can achieve success in the core skills and subjects covered by the programme provided they are given increased support and relevant teaching to achieve this. Enthusiasm and aspiration related to what FFA could offer were present and represented a pedagogical asset.

Interruptions and redesigns

There were many interruptions that were navigated in this process, including the Covid-19 pandemic and the attendant lockdowns that occurred throughout 2021 which facilitated a rapid and unexpected shift to mobile technologies, freely available open educational resources, and WhatsApp groups for instruction. This shift from a blended learning model, where the face to face instruction in the dedicated learning centres was the explicit emphasis of the overall programme, to an exclusively online, mobile-based model was predictably problematic for a number of reasons: the stark differences in connectivity in the Kiryandongo settlement vs Kampala, the capital; the existing English language, maths, and digital skills of the two cohorts; and the difficulties in providing ongoing psychosocial support through mobile devices. While both the blended model and the fully online model emphasised a minimalist approach in terms of technology use, there are notable differences in how that minimalism was structured. Many of these differences are captured in programme outputs (Akello et al. 2023; Nanyunja et al. 2022) but these were partly surfaced as a result of the programme's explicit commitment to being a contextualised blended bridging programme, designed in response to the specific needs of refugee learners in Uganda and the higher education sector within the country.

This meant that the curriculum had to be designed in response to baseline assessments of the students selected for the programmes, and delivered through platforms that suited the specific conditions of the learning centres in Kiryandongo and Kampala. Rather than a reliance on existing open educational resources, which can render as contextually irrelevant and reinforce Western-centric perspectives of what constitutes knowledge (Almeida 2017) and mitigate social inclusion for groups that might otherwise be excluded from knowledge production (Jhangiani and Biswas-Diener 2017), the curricular material was largely bespoke, drafted specifically for the purpose of FFA. Such a resource-intensive approach to curriculum design sits at odds with the discursive scaling of education but is consistent with the need for significant localisation in this refugee education context (Arinto, Hodgkinson-Williams, and Trotter 2017). It is in both this bespoke curricular design and in the broader national and international discourses around a scale predicated on

technology use that we see how minimal computing is imagined, constrained, and executed in this context.

Methodological positions: refugee education and minimal computing

What is presented in this paper methodologically emerges from interrelated streams of project activity associated with FFA, including survey and other monitoring and evaluation (M&E) data, alongside a secondary round of data collection involving qualitative accounts of the project from teachers, students, and the programme team captured after the project had concluded.

Much of the aforementioned project activity is distilled into a 'toolkit', a series of outputs designed to help those who might want to consider an educational project aimed at refugee inclusion into higher education (Akello et al. 2023). In this toolkit, we present a scoping tool for effective assessment of the needs and capacities of refugees and displaced young people in relation to accessing and succeeding in higher education, including existing pathways, requirements, and obstacles; a design framework for the development of supported blended learning interventions for and with displaced youth that take into account the relevant barriers and facilitators in the local context as well as the specific psycho-social support needs of the target population; and case studies of two related refugee education initiatives (Akello et al. 2023). This toolkit contains a number of frank appraisals of programme activity, particularly in regard to the use of technology, drawn together as lessons learned. Further data that informs this paper includes project communication, reflections, and a range of marginalia drawn from project documentation spanning 2019–2022.

As such, the sample for this research is drawing in greater or lesser amounts of all students on the FFA programme (40, with 38 students attending the entire programme), all staff who taught on the programme (8), and all project team members who contributed to FFA since its inception (20) at RLP, the American University of Beirut, and the University of Edinburgh. The data emerging from this activity was organised in broad categories according to the way it informed our understanding of minimal computing before it was opened and then axially coded in NVivo. Since we worked with various categories of participants – students, RLP staff, broader programme team – several themes surfaced from the data that could not all be presented here. Some of these are captured in Nanyunja et al. (2022), Akello et al. (2023), and Gallagher et al. (2024). What is presented in this paper is ultimately a critical reflection of FFA activity from the authors.

The authors acknowledge that refugees are a particularly vulnerable group and hence there are various ethical complexities associated with researching, complexities in which RLP are quite versed. Past research (Awidi, Quan, and Baffour 2020; Espinoza 2020; Hugman, Pittaway, and Bartolomei 2011) and RLP were instrumental in providing ethical context for this work, as were considerations for the ethical dimensions of the role that digital technologies had to play in the research process (Breslin, Shareck, and Fuller 2019; McSweeney, Hakiza, and Namukhula 2022). It should also be noted that all the FFA participants were above the age of 18 and informed consent was received. Throughout the duration of FFA and subsequently, since, we have been cautious in discussions with the refugee students to focus specifically on FFA while avoiding questions that would cause unintended discomfort by discussing matters relating to their personal stories as a vulnerable group (Sinclair and Sinatti 2022), their migratory passage, or their experiences of initial displacement. The authors sought and received ethical clearance at the University of X through a formal ethical review body.

Refugee education, minimal computing, and FFA assets

The adoption of any technology for educational effect, and the types of critical appraisals of that use being performed in writing such as this, is bound in the work of 'observing emerging technologies, questioning the hype surrounding them and reflecting on their sociopolitical implications'

(Macgilchrist 2021, 243); and 'the work of asking how educational technologies are contributing to the reproduction of inequalities or the exacerbation of injustice' (244). Both these duties are particularly relevant for countries such as Uganda and for refugees within these contexts. Both help us discursively explore alternatives that resist an 'innovation' that is 'defined by newness, scale, or scope' (Risam and Gil 2022), in which many development discourses are problematically intertwined, and allow us to explicitly turn to matters of 'technology access, participation, sustainability, stewardship, and equity' (Wythoff 2022).

Minimal computing suggests a set of operating constraints (Risam and Gil 2022). Within refugee education in Uganda, constraints abound and are, at times, problematically entwined (Gallagher, Najjuma, and Nambi 2023; Najjuma, Gallagher, and Nambi 2022; Nambi, Najjuma, and Gallagher 2023). However, this might also suggest an emphasis on the 'right' constraints, such as usefulness (Caria 2016), contextual relevance, educational impact, or affordability. Constraints needn't be presented as deficits but rather as available assets (Risam and Gil 2022) for use in a particular educational context For FFA, this distinction between constraints and assets wasn't merely semantic but rather a conscientious one: we chose to engage with the principles of minimal computing rather than merely doing so out of necessity (Risam 2018, 43). The technology, we hoped, would never achieve discursive or design supremacy over the curricular imperatives of health and educational inclusion.

Assets needn't be exclusively technological, however. These included the range of languages of use by FFA students, necessitating English as the shared language of instruction and further necessitating the explicit emphasis on English language education in the FFA curriculum. It is useful to note that most if not all students learned English later in life, or as a result of their participation in FFA. The pre-existing skills and qualifications of the students acted as a constraint of a different sort, suggesting the curricular imperative of flexibility in how each of the learning centres was progressing through the instruction: students in the Kiryandongo learning centre were starting from a much less advanced space than those studying at the Kampala learning centre.

The non-educational commitments of the students to their work, or families; the physical navigation to the learning centre itself multiple times per week; and the financial ramifications of this activity suggested again a particular constraint that acted as a design imperative for FFA. The motivation, self-confidence (as shown by the high self-efficacy scores of Table 1), and general aspirations of the students were also key assets we could incorporate into the design of FFA.

To use or not to use technology?

Technologically, the FFA team was explicit in asking about the role of technology at the onset noting the inadequacies of 'ready-made 'plug and play' approaches emphasising self-led learning and open educational resources (OER) largely imported from Global North institutions. Such ready-made approaches, the authors felt, were contextually irrelevant to these refugee students at least partly due to the tendency of OER to reinforce epistemic divides (Wallis and Rocha 2022), foreground and prioritise largely Global North forms of knowledge (Hodgkinson-Williams and Trotter 2018), and marginalise local pedagogic practices (Wolfenden 2019). Such approaches were at odds with the organisational ethos of FFA and its emphasis on psychosocial support and holistic care, the existing rights-based orientation of the work of RLP which explicitly emphasises empowering forced migrants with communication skills 'to be able to demand and defend their rights' (Mulondo 2020), and our focus on providing contextually relevant educational development. The FFA project team explored using OER to identify potential areas where such resources could supplement the existing bespoke curriculum, but these resources were never the primary form of instruction.

Perhaps owing more to the distributed nature of the overall FFA project team (Makerere University, the American University of Beirut, and the University of Edinburgh) and the duration of the project (2019–2022) and less to the actual FFA curriculum itself, we opted for a blended learning model, one that emphasised the face to face instruction taking place in the learning centres. Again,

the constraints of the distributed project team necessitated, or was seen to necessitate, a reliance on technology in order to collaborate. This increased the collective capacity of the project team but also carried disadvantages in terms of unequal access to technology, connectivity, and related skills resulting in uneven participation in different aspects of the program among students and staff. This is, the authors feel, an area that deserves further critique in the literature on minimal computing, that of the larger programme apparatus that informs the subsequent educational design. A distributed project team acted to some degree as a constraint that could only be overcome through the explicit use of technology; this constraint carried into the use of technology in the educational design itself.

The FFA team engaged with other initiatives designed to mitigate barriers to digital inclusion, such as Kolibri, an open-source learning management system that allows for authoring and peer-to-peer sharing without the need for Internet connectivity. Kolibri has been used to educational effect throughout Uganda in refugee education contexts (Nanyunja et al. 2022) and in select government schools (Kabugo 2020). Beyond providing an openly available technological option, Kolibri highlights the role that connectivity plays in the narrative framing of refugee inclusion in higher education, namely as an act of mitigating the exclusionary barriers posed by intermittent, expensive, and often unavailable internet access. In the learning centres, one laptop with connectivity was seeded with the curricular content and then distributed to all the other laptops using a local wifi network. It is interesting to note though how Kolibri was used in FFA: distributed programme teams developed the educational content, and distributed that through Kolibri for use in face to face instruction in the learning centres. Kolibri in this respect acted less as a 'site' of learning but rather as a distribution node. The pedagogical emphasis, until the national lockdown beginning in June of 2021, was decidedly on the face to face instruction.

Ugandan refugee settlements are often bound in places with poor infrastructure, where makeshift and temporary mobile masts sit with intermittent power grids and uneven (mobile) technological ownership, access, and use. Such a necessity for colocation in the learning centres however proved to be a formidable constraint during the pandemic and the long national lockdown that took place in 2021, where most institutions were locked down from June 2021 to January 10th 2022. One of the world's longest national lockdowns, it was only partially lifted on 31st July 2021 for some institutions but there was still a curfew in place until 2022 (Muhumuza 2022). This greatly limited access to the learning centres, necessitating a sudden and problematic shift to other technological approaches.

When the learning centres became unavailable, additional resources were used to purchase mobile phones for students to continue their studies through an approximation of remote learning developed by the FFA team in response. As such, a second technological approach (mobile technologies, some mobile data cost offset through financial stipends, and remote learning through WhatsApp and Zoom) was problematically thrust on top of an existing one (dedicated learning centres with hardware and connectivity). At best, this was evidence of the FFA team engaging in practices that 'privilege making do with available materials to engage in creative problem-solving and innovation' (Risam 2018 43). Yet it created further discrepancies between the two sites with cellular coverage in the capital of Kampala being much greater than that of Kiryandongo, situated as it is 225 kilometres from Kampala. There are anecdotal accounts in the data of students in Kiryandongo gathering under a cellular mast (tower) at the settlement to access, often unsuccessfully, the daily Zoom calls for instruction, suggesting the need for 'movements that though born digital move fluidly in and outside the digital' (Ross 2021, 485). The lockdown problematically bound us, discursively and materially, in a digital space when other, perhaps analogue, technologies might have otherwise proven more viable.

There is a growing trend for advancing techno-optimist 'solutions' for refugees and presenting 'digital proficiency' as an appropriate approach for the most vulnerable (Rushworth and Hackl 2021). While the programme teams believed at the onset of FFA, and still believe, that the digital skills developed as a result of specific instruction on digital technologies, and more broadly whilst

engaging with a blended learning curriculum, would be beneficial in both their academic and professional lives (Akello et al. 2023, 107), the use of digital technologies, and therefore the tension posed with minimal computing approaches, was birthed at the inception of FFA. Minimal technological approaches were possible, but not those that excluded technology altogether.

Yet, while our sample is small and lacks a proper control group for comparison, qualitative evidence suggests that the minimal computing approach led to the general development of digital skills and enhanced, in the medium run, the possibility for these students to engage in other digital practices that might benefit their professional or academic lives. In our survey, students report increased ease with digital technology for solving learning-related problems (see Figure 1 below). Whether or not this modest gain in ease of use warranted the larger technological infrastructure in FFA is contested In this, the FFA team was willing to consider that digital technology itself might have qualified as something we were willing to give up (Risam and Gil 2022), or further made secondary to the face to face instruction taking place in the learning centres.

Implications for minimal computing in relation to refugee education

The implications for the types of minimal computing that FFA suggested are around how education is designed and performed with and without technology, particularly for those working towards the educational inclusion of traditionally marginalised groups. As refugees exist in a particularly marginalised relationship to the bodies of civic participation – higher education included-minimal computing is instructive here in terms of how a curriculum can be designed and taught that acknowledges and begins to mitigate that marginalisation, and what relationship to technology, if any, that curriculum has. We return to the four questions of minimal computing as put forth by Risam and Gil (2022), this time as a retrospective critique of the efforts of FFA to more fully realise that discussion.

What did we need?

The use of digital technologies from the inception of FFA potentially collapsed what might have been a more productive, broader definition of technology itself, one that included non-digital forms. There is a need to broaden the often-monolithic presentation of what technologies matter in education, to include more explicitly analogue, digital, networked digital, and SMART
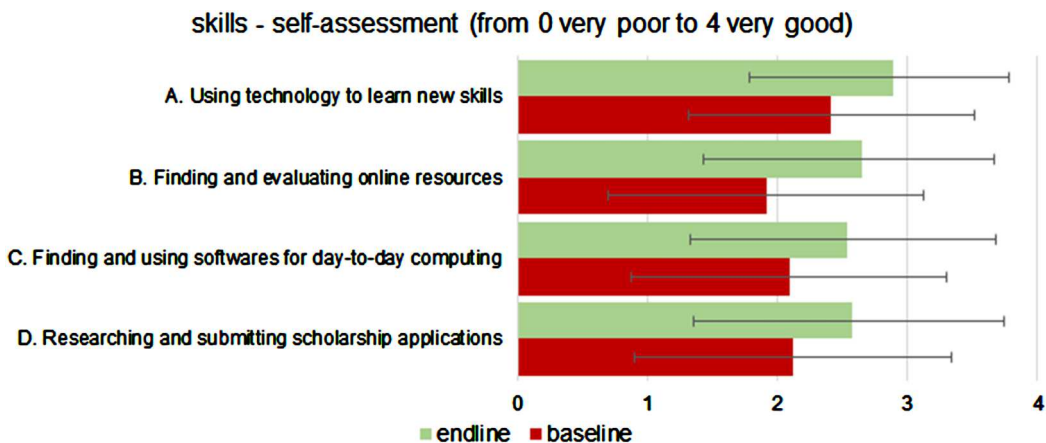

Figure 1. Self-assessed digital skills before and after the FFA programme. Note: The sample is restricted to 33 students at baseline and 28 at the endline. T-tests show differences in cases A ($p = 0.07$) and B ($p = 0.001$). Values are borderline significant at $p < 0.1$ for C and D.

technologies, to note and more fully incorporate the range of technologies available to us in our educational design that is best suited to the specific attributes of the educational context being served. For particularly marginalised groups, such as refugees, this can and should involve the combination of technologies in critical and meaningful ensembles: paper, pens, radio, televisions, mobile devices, laptops, printed materials, and more (Gallagher, Xu, and Williamson 2022). As such, what we needed was a broader definition of technology to include analogue and other widely used technologies, one flexible enough to adapt to the lived realities of specific educational contexts.

As discussed earlier, a bespoke curriculum and ultimately a bespoke use of technology were deemed critical to FFA's ultimate aim of educational inclusion for refugees in Uganda. Such an approach is problematic when seen through broader efforts at educational inclusion through technology and their explicit emphasis on utilitarian scale where 'scaling-up technologies are often prioritised over-reaching the worst off' (Winters et al. 2020, 260). If we adhered to these scaling-up technologies-commercial learning management systems, de-contextualised OER, and an emphasis on self-led learning-to reach the most marginalised, then, perhaps paradoxically, we would be advocating for digital inequality to be built into the system: in other words, this approach would be limited to relying on pedagogies that this technology is constrained to support. What we needed, and we would argue all programmes striving to reach marginalised populations need, are approaches and attendant technologies that speak to the specific conditions inherent to the condition of marginalisation, ones that countenance the particular challenges in power, connectivity, access, mobility, and finance often associated with the refugee condition.

We argue that prioritarianism is instructive here, both for FFA and for minimal computing more broadly. Prioritarianism contends that the learning needs of the most marginalised are prioritised in educational design. If the most marginalised are not prioritised – or designed for – in these drives towards greater technological use, then their marginalisation is inevitably accelerated. As FFA was specifically directed at and designed for refugees in Uganda, this prioritarianism was satisfied to some degree, yet there is a reflective need here for the programme team to understand how FFA interactions could be 'subtly oppressive' (Winters et al. 2020, 263) and potentially reinforce power asymmetries, particularly as technology was new to many of the students. As such, and in summation, what we needed, and still need, was a broader definition of technology, an explicit prioritarian emphasis on the most marginalised, and rigorous reflective practice to note how programme interactions might have reinforced power asymmetries.

What did we have?

What we had, and what we acknowledge are significant assets seen through minimal computing approaches, was the work of the Refugee Law Project (RLP) and their considerable expertise, particularly in many of the core areas that FFA was attempting to address: psychosocial support as both a taught subject and an ongoing counselling provision; English as a taught subject, particularly as framed around the capacity to exercise one's legal rights as a refugee (Marino and Dolan 2021; Nabaweesi 2019); a visible and active presence in the communities in which these refugees often live or would be expected to assimilate (Kansiime and Tusasiirwe 2017); and as a key node in a larger network of government and non-government actors engaging in refugee integration (Nakueira 2021). Further, RLP's affiliation with the School of Law at Makerere University also acted as an asset offering some degree of access to the university administration, and in particular its admissions processes.

Further to this was the cohort of students themselves and their ambition and capacity in respect to the education being presented. We acknowledge that this sample of students is far from representative of the general refugee population, or even of the student population. These students were recruited from an already advanced pool of applicants. Our students were non-traditional in the sense that along with being refugees, they generally skewed older and had high levels of reported self efficacy. As discussed prior, all students were of a minimum level of English ability having

completed a prior RLP language programme. The capacities of the students themselves, as such, represented an asset we did have.

Further, RLP's history of work in media-based advocacy provided a conceptual bridge to the technological use that FFA was purporting and encouraged the FFA team towards a more justice and rights-based approach in their curricular design. RLP's advocacy has taken the form of ongoing blogging, podcasts (Mulondo 2023), and video advocacy documentaries created with and for refugees and the larger communities that are hosting them, and represent a DIY ethos towards technological use consistent with its purpose of advocacy. While we are cautious to overly valorize 'DIY infrastructures built out of necessity' (Wythoff 2022), RLP's media work acted as an asset, providing an emphasis on foregrounding student and community voices in the work of FFA. It has, to some degree, involved students and staff with 'the making of learning, from the messiness of the process' (Bessette 2023, 120). This media-based experience potentially represented a curricular design aesthetic better suited to FFA: podcasts, video documentaries, and blogs featuring the voices of those teaching and being served in these programmes directly.

When possible this aesthetic was carried into FFA through dialogue with outside speakers working directly with the students but might have been more readily realised with a greater emphasis on the curricular materials and the pedagogy on the types of media that RLP were already versed in, ones that more generally might be seen as ascribing to a DIY aesthetic. This might have included participatory digital visual methodologies, photovoice, participatory video making, visual diaries, and digital storytelling using mobile phones and the more explicit use of mobile phones as pedagogical assets, a use that is suggested as being already present in the political economies of technology use in refugee communities in Uganda (Humble et al. 2020). It is a use that would explicitly involve students and the programme team, again in 'the making of learning, from the messiness of the process' (Bessette 2023, 120).

Such approaches were made more readily available when the national lockdown occurred and access to the learning centres and any sort of instructional co-location was rendered impossible. Instruction, however uneven and unavailable for some, moved to mobile technologies and our pedagogical imagination might have been more readily moved with it through an engagement with mobile pedagogical approaches and their interplay with analogue technologies, such as paper-based approaches. Ultimately, this surfaced the curricular need for pedagogical approaches and curricular designs that allowed 'for movements that though born digital move fluidly in and outside the digital' (Ross 2021, 485).

What should we have prioritised?

Aside from the more ready embrace of existing RLP media work and the DIY aesthetic implicitly contained therein, FFA's emphasis on rights-based communicative development and extensive psychosocial support and instruction was prioritised. As the design of FFA was predicated so explicitly on psychosocial support and the development of communicative skills, this naturally tethered us away from a fully online education and the emphasis on scale that accompany such approaches. Such fully online approaches towards refugee education (discussed in Halkic and Arnold 2019; Reinprecht et al. 2021) tend to emphasise self-led learning through online modules with routine online tutorials with teachers. The authors felt that such an approach was not contextually appropriate for FFA due to many of the OER critiques as discussed in this paper, as well as the fact the co-location of RLP staff and the students we would be serving in FFA was, at least before the lockdown, a pedagogical asset. As such, this emphasis on co-location naturally prioritised a more minimal view of the use of technology on the project. Technology gave way to human instruction.

Further prioritisation might have more readily embraced a 'postcolonial pedagogy', or one that foregrounds 'plurality and the critical examination of local politics, histories, and aesthetics resisting fetishization of the "other"' (Risam 2018, 95). RLP was very instructive here in ensuring the curriculum emphasised communicative capacity that allowed for these students to express and act on

their rights as humans; in this emphasis, and in the curricular emphasis on contextually relevant bespoke content, we sought to foreground the specifics of the Ugandan content, and begin to move away from the 'othering' that predictably occurs as a result of being labelled a refugee.

Such a prioritisation carries with it significant resource allocation and minimises opportunities for scaling out such a provision as FFA, but offers opportunities to critically examine not only the political contexts in which these students find themselves, but also critically examine the technologies themselves to more fully situate them in their 'sociopolitical, legal, and historical contexts' (Witteborn 2011, 28). This critical examination troubles the idealised presentation of the 'connected migrant' (Awad and Tossell 2021) often found in utilitarian narratives, narratives that serve to delegitimize non-use of technologies and obfuscate the more problematic aspects of their use, such as exposure to an increasingly comprehensive surveillance regime and the psychosocial impact of perpetual connections to 'home' (or what Twigt (2018) refers to as the affective affordances of digital technologies). This examination treats digital technology itself as a pedagogical asset, one that might stimulate critical appraisals of the political economies of technology use, alongside the refugee students' place, or not, within those economies.

What should we have been willing to give up?

What minimal computing provides that digital education discourse more readily needs to embrace is the methodological framing needed to enact degrowth models to educational development. Degrowth approaches focus on 'conviviality, commoning, autonomy and care' (Selwyn 2022, 1) and these all have parallels in the FFA projects and indeed in theoretical models often used with marginalised populations in the Global South, such as capability approaches (Sen 1990, 1992, 1993). Minimal computing and its emphasis on constraints and assets links quite explicitly to capability approaches with its emphasis on removing unfreedoms and promoting capability (Haenssgen and Ariana 2018).

What minimal computing provides is the methodological means to enact those theoretical positions, to question the discursive positioning of 'digital technology as a sociotechnical system' that 'is set up to push people into thinking that they need more technology, and that *not* having more technology is a retrograde step' (Selwyn 2022, 3). This discursive retrograde positioning naturally delegitimize approaches that don't feature digital technology. This rendered to some degree in FFA itself as the initial blended model emphasising co-location in learning centres gave way during the lockdown to mobile technologies and a more DIY aesthetic: the second technological approach was born by the first as the digital emphasis was encoded into the curriculum.

Concluding candour

Projects like FFA exist in many areas where forced displacement is a contextual reality, often bound together under the term connected learning (the subject of an upcoming special issue edited by Charitonos, Najjuma, and Gallagher 2024). Connected learning discursively foregrounds the use of digital technology towards educational inclusion for displaced populations. Yet, what we have considered (explicitly in Akello et al. 2023) is whether it was possible to deliver FFA, or indeed any connected learning initiative, without digital technology, or with a design that more readily favours analogue technologies such as paper materials. As such, the authors willingly concede that what we were willing to give up was the digital technologies themselves. While their use did promote some gain in digital skills amongst the students and allowed for project collaboration among three geographically disparate institutions, their impact pedagogically in relation to the resources needed to acquire and maintain them was contested.

Yet, we feel this open questioning of the role of digital technologies in educational design directed at marginalised populations is in itself significant. We assert that the candid reflections in this paper suggest the possibility of an educational future that resists the seeming inevitability

of commercial edtech encroachment and its attendant discourses of scale, newness, and unfettered technological growth. The future that we propose, and that FFA suggests, is one that might already exist in the political economies of local educational contexts, where an edtech minimalism, if not non-use, is driven by a pedagogical emphasis on justice, health, and inclusion.

It was hoped, and still hoped, that projects like FFA could help build a socially, politically and culturally relevant pedagogy with the people who would be teaching and learning from it. It is further hoped that it might provide some insight into how this might stimulate a form of collaboration that is genuine rather than merely tokenistic. Such collaboration depends on critical candour that the authors hope this paper surfaces as to the role that technology may or may not play in working with marginalised populations. Such candour is made possible, at least partly, through the sustained collaboration of the project team and the trust that has developed as a result. The authors would argue that such candour is also critical in realising minimal computing approaches in particularly marginalised populations, note how technology can render discursively in ways that far outstrips its utilitarian value, and see the critical capacities and constraints of the project team as an asset in resisting, or reimagining broader digital discourses around educational inclusion.

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