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► **To cite this version:**

Monica Grace Amuha, Silvia Masiero. Data Use as Liberation: A Case from an Education Management Information System in Uganda. 17th International Conference on Social Implications of Computers in Developing Countries (ICT4D), May 2022, Lima, Peru. pp.504-514, 10.1007/978-3-031-19429-0_30 . hal-04601158

HAL Id: hal-04601158

<https://inria.hal.science/hal-04601158v1>

Submitted on 6 Jun 2024

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Data Use as Liberation: A Case from an Education Management Information System in Uganda

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Research in Progress

Abstract: the Information Systems (IS) literature explores multiple consequences of data use practices, including the role of such practices in achieving empowerment. Limited knowledge is, however, available on the role of data use in fighting political bias, a phenomenon through which an individual or a group's political influence diverts resources away from their optimal purposes. In this paper we rely on Freire's concept of *liberation* to study a pilot project of an Education Management Information System (EMIS), conducted in two districts in Uganda, to illuminate the links between EMIS data use and the delinking of education managers from political bias. Our field data enable us to theorise EMIS data use as a practice of liberation, aimed at strengthening decision making processes crucial to development policy.

Keywords: Data use; Education Management Information Systems; Empowerment; Liberation; ICT4D

1. Introduction

Data use, especially when referred to public sector domains such as health and education, is a prominent topic in the Information Systems (IS) literature [6-8, 20, 38]. Among many strands of discussion, one centred on information and communication technologies for development (ICT4D) depicts health and education data use as a practice of empowerment, through which people are endowed with the ability to pursue the life they want [35]. Empowerment is multifaceted in ICT4D [3,4], with Senian views of empowerment framing this concept in terms of people's ability to achieve the life they want, ultimately resulting in the pursuit of freedom in the face of constraints [32].

Limited knowledge is, however, available on the role of data use in fighting political bias, a substantial constraint to human empowerment which limits people's ability to pursue their freedoms. Political bias is presented as a phenomenon in which an individual or group's political influence diverts resources away from their optimal purposes, hampering development policy across many sectors [10]. Political bias results in resource distributions that follow politically determined preferences rather than the needs of the people, substantially preventing socio-economic development efforts from proceeding optimally and allocating resources in ways that maximise human freedoms [35].

In this paper we draw on the pilot implementation of a decentralised Education Management Information System (EMIS) in Uganda to begin outlining a theory of education data use as *liberation* from political bias. Drawing on data from the EMIS pilot project, conducted in two districts of Uganda in February and March 2020, we use concepts from Freire [17] to show a process in which education managers built critical consciousness and, on this basis, developed the agency needed to reappropriate technology towards liberation. This adds to existing conceptualisations of empowerment by showing how liberation from political bias, achieved through data use, participates in empowerment.

The purpose of this research-in-progress paper is to set the basis to theorise EMIS data use as a practice of liberation, defined in Freirian terms as the freeing of the oppressed through illumination of the root causes of disadvantage [30]. The concept of *liberation* adds to existing data use research by showing the potential of data use to free human beings from external sources of subjugation.

This paper is structured as follows. We first map the literature on data use and empowerment, focusing on the dimensions of empowerment that such a literature has contemplated. We then introduce the case of the EMIS pilot

project in the districts of Gulu and Mayuge, Uganda, to illuminate EMIS data use as a practice of liberation. The discussion positions such a practice in the existing literature, introducing liberation as a core component of empowerment achievable by collectives through data use. Implications are drawn for the literature on data use in ICT4D.

2. Data Use: From Empowerment to Liberation

Data use has emerged as a prominent research topic in the IS field. Such a prominence is, somewhat paradoxically, countered by the paucity of scoping exercises on it, which are mostly focused on health data use [8, 20, 38]. As noted by Byrne and Sæbø [8], data use does not refer to the quality of data or access to them by individuals, but to effectively utilising them for diverse purposes. Multiple branches of IS have dealt with public sector data use, considered in its diverse manifestations.

Research shows how data use can empower individuals to better perform critical tasks in the health sector [20, 38]. Against this backdrop, the link between data use and empowerment offers the core perspective through which data use is depicted in IS.

2.1. The Core Perspective: Data Use as Empowerment

Byrne and Sæbø [8] note the breadth of the literature on data use. They do, at the same time, note the primary focus taken by this literature: it is a focus on data use as empowerment, framed, with Sen [35], as the possibility for people to pursue the life they want. Wide presence of an empowerment lens in data use literature has an important implication: data use, beyond quality and access, is leveraged in the pursuit of freedoms that lead to people's empowerment [32]. Studies in the data use landscape focus on multiple dimensions of empowerment: two examples are sub-national *districts*, empowered by greater awareness of data on their populations [11], and *digital platforms*, which are converted into tools for bottom-up decision making [5, 28].

In a recent literature review, Pandey and Zheng [29] map the core dimensions of empowerment used in ICT4D research. They present six dimensions: *community; psychological; gender; cultural; economic; political and structural* [29]. While varied, these dimensions have a common matrix, found in the view of development as "freedom" from the constraints that prevent individuals from living the life they want [32, 35]. As noted by Sæbø et al. [34], over time the ICT4D field has moved towards a collective vision of empowerment, where the good of the community overcomes the good of the individual in achieving goals such as public health, education or emergency relief.

While data use features strongly in discussions of empowerment, it does not feature as strongly in terms of *political bias*, a phenomenon in which the political influence of an individual or group diverts resources away from purposes that would be optimal for the community [10]. On the one hand, the literature review by Byrne and Sæbø [8] shows that there are many ways for data use to foster human empowerment. On the other hand, none of these ways contemplates political bias as a phenomenon that conditions people's ability to achieve empowerment. A multidimensional framework of data use for development still needs a proper theoretical understanding of political bias, one that, further developing the *political and structural* dimension of empowerment outlined by Pandey and Zheng [29], unpacks how liberation from political bias can act as a route to empowerment.

2.2. A Novel Dimension: Data Use as Liberation

In this paper we set the basis to theorise data use as a practice of *liberation*, which allows conceptualising freedom from political bias within the ICT4D field. On the one hand, Sen [35] argues that development is fundamentally predicated on people's agency, as a route to expose unfair social norms and foster social change. On the other, researchers have criticised the capabilities approach due to its limited engagement with praxis, a critique that, featured in seminal ICT4D work on this approach [40, 41], leaves subjects uncertain on the actionability of such an approach.

The concept of liberation, theorised in Freire's [17] Pedagogy of the Oppressed as a route to freedom from injustice, lays the conceptual basis for such an engagement with praxis. Liberation is conceived, in Freire [17], as a process in which oppressed communities acquire awareness of the roots of structural disadvantage, and are then enabled to use

such an awareness to challenge the sources of their subjugation [30]. Theoretically, the two building blocks of Freire's notion of liberation are the concepts of *critical consciousness* and *agency*, which Freire [17] engages as follows:

- *Critical consciousness* refers to the human ability to read the world critically, identifying oppressive and alienating conditions in the status quo. Freire frames critical consciousness as achieved by laying bare the roots of structural inequality, engaging the structural factors that make people systemically prone to abuse and injustice. Central in the Pedagogy of the Oppressed, his educational method consists of a problem posing methodology [30] to enable participants make sense of the bases of their oppression: this may involve, for example, inducing people to interrogate themselves on the roots of the injustice they suffer, and on the power dynamics behind them [36]. Development of critical consciousness in the oppressed is, in Freire, the epistemological basis of liberation.

- *Agency*, conceptually predicated on the development of critical consciousness, refers to "the ability to act in the world to change it" [30]. In Freire's theorisation, individuals who, based on the pedagogical method, develop critical consciousness, are enabled to convert such a consciousness into action that concurs to the achievement of freedom. While fundamentally based on the theoretical components of the pedagogical process, agency embodies the praxis at the core of the pedagogy of the oppressed, through which subjects of systemic injustice act against the sources of oppression. Though action is not a necessary consequence of the development of critical consciousness, agency, as the ability for individuals to choose which action to take, is fundamentally based on it.

Poveda [31] notes that lack of actionability of Sen's capabilities approach is filled by the coexistence of theory and praxis in Freire's pedagogy. The actionability of Freire's approach explains how it has inspired the work of multiple organisations, aimed at liberating people from the constraints of injustice through a pedagogy that brings to light the causes of structural unfairness [31, 36]. Unpacking the political and structural dimensions of empowerment in Pandey and Zheng [29] requires an approach to blend theory with liberating action: it is, with Myers [26], a critical approach that blends theorisation of reality with its transformation, to change an oppressive status quo.

Based on Freire [17], we hence propose a vision of data use as potentially connected to liberation from the political bias that poses a constraint to development. In what follows, we present the results of a study of a pilot project of EMIS conducted in two districts in Uganda, where education data use was related to liberation of education managers from the political biases implicit in the system.

3. Case Study: EMIS Pilot Project in Uganda

EMIS are core tools for data use in the education sector. An EMIS is "a system of people, technology, models, methods, processes, procedures, rules and regulations that function together to provide education leaders, decision makers and managers at all levels with a comprehensive, integrated set of relevant, reliable, unambiguous, timely data and information to support them in completion of their responsibilities" [9]. UNESCO [37] defines EMIS as an "ensemble of operational processes, increasingly supported by digital technology, that enable the collection, aggregation, analysis, and use of data and information in education, including for management and administration, planning, policy formulation, and monitoring and evaluation." Both these definitions highlight the systemic nature of EMIS, which is currently being used in Uganda to map education data at the district level.

3.1. EMIS in Uganda: A Three-Phase Timeline

EMIS in Uganda has evolved over three major phases. In the initial phase (2000-2005), the Ministry of Education and Sports (MoES) adopted a computer-based automated solution heavily biased towards the education statistics module, which lacked an interface with the Uganda National Examination Board (UNEB) in charge of examination results from primary and secondary schools. In addition, the personnel module was never operationalised and the system was limited in its single-year design, unable to provide multi-year reporting and longitudinal analysis of key indicators. Funders of the software had exclusive rights to the system, which limited MoES' ability to modify and use it.

During the second phase (2006-2008), another system was designed to be accessed via the MoES intranet and used for management and planning at the central level. However, the system presented problems of usability and lacked a reports module for easy access and visualisation of data.

A third phase (2008-2014) focused on addressing decentralisation needs of education data management and led to the design of a new EMIS, as an integrated solution to enable all stakeholders at MoES to access information via the Local Area Network (LAN) and link data between MoES and districts. At the district level, a Decentralised Education Management Information System (DEMIS) was designed and installed in 134 districts and municipalities, however, with the withdrawal of donor funding, the system was never operationalised nor linked to the central level. This left the MoES planning unit with the option of a centralised EMIS where data is collected using the annual statistical form from schools and entered into EMIS at MoES headquarters [15].

The Annual Schools Census (ASC) is a collection of basic (i.e. enrolment, learner characteristics, teacher details, infrastructure, etc.) educational data from mainly pre-primary, primary and secondary levels of the education system. A copy of the filled form is left at the school, another at the district and the final copy taken to the national MoES headquarters where data is entered in the standalone system and analysed using SQL and Excel. Annual statistical abstracts on data from the census are published on the MoES website and a few copies distributed to schools. This centralised management of data created challenges of work overload due to entry of large volumes of data, limited capacity to conduct data verification and validation from the source and failure to follow up non-reporting schools.

In 2017, a task force to oversee the realisation of a new robust and reliable EMIS capable of addressing the sector's information needs was initiated. In its EMIS review report, a task force highlighted the challenges above and proposed short and medium-term recommendations to revamp the current EMIS. These included redevelopment of EMIS to address current system challenges, operationalisation of dormant modules, strengthening of EMIS legal and policy framework, development of a communication and dissemination strategy, review of the current budget to incorporate EMIS activities and development of a sustainable financing strategy [1, 2, 14]. Following these recommendations, the MoES has, for the last five years, been in the process of redeveloping the EMIS into a robust system, albeit with limited success so far.

3.2. Pilot of DHIS2 for Education

In January 2019 the Health Information Systems Programme (HISP) Uganda initiated engagements with the MoES Basic Education department to pilot the District Health Information Software 2 (DHIS2) as an EMIS in the districts of Gulu and Mayuge. DHIS2 is an open source software used for managing health information in over 73 low- and middle-income countries, currently used in Uganda by the Ministry of Health for reporting on health management data from 140 districts in the country.

During the pilot, several stakeholder engagements, to foster buy-in and support, were conducted for both the central and district level leadership. A requirements gathering process was conducted at the district level and selected schools to further understand the data management processes and data needs at those levels. DHIS2 was configured and deployed in three administrative units in the two districts to support collection, capture, validation and analysis of key education data from primary and pre-primary schools.

End user trainings on data entry, data validation, analysis, presentation and use for MoES central level staff, district education teams, district planners and biostatisticians, and support supervisions were conducted. The pilot districts entered EMIS data, collected on the annual statistical forms for three consecutive years 2016, 2017, 2018 into the DHIS2-EMIS. District dashboards were created as part of the EMIS to present education indicators like gross enrollment, teacher to pupil ratios, reporting rates, performance index, pass rates in visualised tools like charts, pivot tables, graphs and maps to support district education teams and the leadership in planning and decision making.

After a year of pilot implementation, an assessment of the DHIS2-EMIS pilot was made in partnership with Health Information Systems Program (HISP) Uganda, MoES and Save the Children Uganda. The team conducted the assessment in all the three implementation sites between February and March 2020. The overall objective of the assessment was to assess both the MoES and district capacity and readiness to utilise and maintain the DHIS2-EMIS and document lessons learnt to inform national scale.

The assessment methodology included a total of 22 key informant interviews with the MoES central level team (5), the district education team (6), district leadership (4) and school administrators (7). Two focus group discussions with school administrators and members of the school management committee were also conducted to understand the process and challenges of data management, reporting and data use practices at the school level. Primary sources of

EMIS data (data collection tools) at the school level were reviewed to validate data collected in the annual statistical forms and entered into DHIS2-EMIS.

3.3. Findings: The DHIS2-EMIS Pilot Evaluation

Findings from the assessment indicate that overall, the DHIS2-EMIS pilot has had a positive outcome with buy-in from the MoES central level and improved management and use of education data in the pilot districts. The MoES leadership was committed to support the implementation of DHIS2-EMIS, which is in line with the Education Sector Strategic Plan FY 2017/2020 “To Strengthen the Education Management and Information System (EMIS) to collect and process more accurate and timely data for use by decision-makers.”

Through training and support supervision conducted during the pilot, the districts were enabled to collect, enter, validate, present and use data from DHIS2-EMIS to inform district level plans, resource allocation and support supervision activities. The synergy between the health and education department eased implementation of DHIS2-EMIS, with district education teams continuously supported by the district biostatisticians who have longer experience using the DHIS2. Data from DHIS2-EMIS has been used by the districts as a basis for decision making: this affected the distribution of desks, allocation of teachers, building new latrine stances and classroom blocks. In addition, data from DHIS2-EMIS was used to guide planning and budgeting, allocation of resources for vaccination and other health programs in schools.

Most importantly, respondents interviewed through the pilot assessment have noted how the project has acted as a “game changer” in resource allocation [13]. District planners and education managers outlined two different scenarios: in a pre-EMIS era, resource allocation was influenced by local politicians, who exerted their influence to allocate resources in ways that did not reflect the real needs of the districts. In the pre-EMIS scenario, resource misallocation resulted in systematic constraints to empowerment, since a dashboard-centred source of data was not available to counter central decisions.

Transformation of such a scenario was, however, one of the main outcomes in the districts that piloted the EMIS. As powerfully synthesised by one of the district managers interviewed, “you cannot argue with the data”: data use influenced district managers’ ability to combat extant sources of political bias, using EMIS to illustrate the effective needs of the different districts and schools. Becoming aware of political bias, and hence using EMIS data to counter it, was a core process in plying data use to a purpose that goes beyond the dimension of community empowerment [19] that data use is normally adapted for. What was observed in the Uganda pilot project was a proper construction of awareness by district managers, who reappropriated EMIS data use from a tool for empowerment generically conceived to a tool for liberation from political bias, adapted and reappropriated on a daily basis from its own users.

4. The EMIS Pilot Project: An Ongoing Freirian Analysis

Research on EMIS in Uganda is part of an ongoing doctoral project centred on the shift to a decentralised EMIS, a shift of which the pilot project studied in this paper is an integral part. In this section, we map the current status of our research-in-progress work, setting the conceptual basis for theorisation of data use that the work is pursuing.

Such a theorisation starts from how, positioning EMIS within data use research, our study raises several known points in terms of empowerment. The DHIS2 software, a long-term endeavour of digital health in developing countries [6], has recently diversified into education, seeking to project the same empowerment goals that Byrne and Sæbø [8] described for the health sector. Mapping DHIS2 in terms of Pandey and Zheng’s [29] dimensions of empowerment means touching upon several of them: community empowerment, to start with, is achieved by endowing local communities with the ability to manage their own data [11]. Psychological empowerment is also noted in DHIS2 research [22] and, while studies of gender and culture in relation to the software are yet to be conducted, research in the broader ICT4D space shows gendered effects that software changes can have on community empowerment [3-4, 16, 19, 23].

What needs unpacking is Pandey and Zheng’s [29] *political and structural* dimension of empowerment. Poveda and Roberts [30] illustrate the issue: Sen [35] lacks, as noted above, the praxis component found in Freire [17]. Where

empowerment alone runs the risk of depoliticising injustice, overlooking its root causes, Freire's notion of liberation, based on development of critical consciousness, shows how freedom is based on learning the structural causes of disadvantage. Such a process affords individuals to enact agency, entering a process of resistance which builds the structural roots of liberation.

This is the process that is unfolding with EMIS in Uganda. All resembles a classic DHIS2 project: data are put in the hands of district managers, allowing them to take informed decisions on important topics. But the pilot has shown an unknown dimension, for which it is not so much community empowerment, but liberation from political bias that interviewees have clearly articulated. Interviews have outlined clear differences in the two scenarios: a pre-EMIS one in which political bias was present, and a post-pilot which allowed district managers to develop critical consciousness of such a bias and use EMIS to counter it. While anti-bias agency is predicated on many factors, and surely not only on the availability of a technology that puts data in the hands of education managers, data from the pilot project show the strong instrumentality of such a technology in countering political bias.

These raw observations, conducted in this initial phase of our research, led us to see Freire's concept of liberation as a guiding light through the phenomenon we are observing. While other candidate theories are being considered, two more tasks can be pursued through Freire [17]. First, a vision of disempowerment that instead of remaining superficial (for example, single instantiations of misallocation of resources in a given district) analyses the deep structural reasons for such occurrences, individuating structural patterns that repeat themselves over time. Through Freire we can analyse the self-perpetuation of injustice [25], enabling not only and not so much the external observer, but *the oppressed* community experiencing injustice to make sense of it.

Secondly, we can link these to broader theorisations of injustice in ICT4D. The field's turn to issues of power and justice [18, 21-22, 24] specifically invites us to do so. In an ICT4D landscape whose core matter is not anymore development, but *justice* defined as fairness in the way people are dealt with [11; 21], understanding the structural roots of injustice has a crucial importance that it did not have before. Equipped with Freire's pedagogy of the oppressed, applied to an open source software for a long time framed in terms of non-political empowerment, we seek to produce a theory in which data use is openly and clearly linked to the possibility of liberation.

5. Conclusion

This paper has reported on an ongoing research project on EMIS, in which we seek to theorise data use as a practice of liberation from political bias. In doing so, we unpacked the political and structural dimension of empowerment from Pandey and Zheng [29], showing that the purpose of data use is not only, and not so much in terms of community empowerment, but in terms of the freedom from political bias achieved through the engagement of education managers with EMIS data sources.

Two main directions are to be pursued across future stages of this research. First, as an ongoing doctoral project, the research will involve further data collection on EMIS Uganda, to monitor the further developments of the project and the meaning of these for education managers through the state. As the EMIS is scaled across the country, the questions of liberation from political bias posed here become of relevance at a national scale, with important implications for the making of any initiative that aims to put data at the service of better education outcomes.

Second, the theory-building potential of this project is strongly tied to ideas of justice. The fact that data management systems like DHIS2 enable community empowerment has been noted across multiple works, but the possibilities of such software for the countering of political bias are much less well understood. In the context of today's ICT4D research, increasingly tied to visions of justice as the heart of development, understanding the root causes of structural advantage is a strongly needed component of theory-building efforts. We hope, with this work, to have offered a conceptualisation that can contribute to such efforts.

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