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Educators' understandings of digital classroom tools and datafication: perceptions from higher education faculty

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Research has shown that critical data literacies development for educators is seldom a core component of most campus conversations about datafication, even as extractive, datafied systems become pervasive throughout the higher education sector. This article outlines findings from an international, qualitative, Comparative Case Study (CCS) of university professionals teaching online during the COVID-19 pandemic. It overviews beliefs and barriers shaping educators' responses to datafication and focuses specifically on their perceptions of faculty development opportunities related to digital classroom tools and to datafication more broadly. The article presents insights into how faculty understands higher education's contemporary datafied infrastructure and highlights participants' voices about faculty professional development and critical data literacies. Based on our findings, we recommend formal faculty development and broader professional learning conversations as a means of enhancing faculty awareness and agency within the higher education sector.

Keywords: datafication; higher education; data; datafied systems; technology in education

Introduction

More information is now gathered, collected, sorted, and stored about the everyday activities of individuals in the world than at any other point in human history (Andrejevic, 2012). In higher education, digital systems through which information is extracted, accumulated, and collated are pervasive, governing registration, financial services, research, communications and credentialing, as well as online teaching. The automated extraction of information these digital systems make possible is known as datafication, 'the process by which subjects, objects, and processes are transformed into digital data' (Southerton, 2020, p. 1). Across digital platforms and the underlying datafied systems, every click, every log in, site visit, and every Terms of Service (TOS) notification accepted are compiled on a mass scale. Even keystrokes and actions we believe we have deleted may be tracked or collected as part of a platform's data profile (Mozur et al., 2022). More broadly, social, pedagogical, and administrative actions that may previously have been unseen or untraceable are now transformed into data that can be monitored, tracked, analysed, and optimised

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(Shilova, 2017). Thus, an institution's collective actions become transformed into quantified data, 'rendering social and natural worlds in machine-readable formats' (Williamson et al., 2020a, para. 2).

Datafication shifts how the activities of teaching and learning are structured and understood at institutional levels, introducing analytics and automation into educational decision-making and opinion-forming processes (Schofield, 2021; Selwyn et al., 2020). The shift towards data as foundation for institutional decision-making undermines the principle that correlation does not equal causation: datafied processes operate on mass correlation. Since academia is built on the scientific method, this departure represents a fundamental paradigm shift in the professional landscape of higher education teaching staff (Stewart et al., 2023). However, the datafication of education systems often remains invisible to both students and faculty (Szcyrek & Stewart, 2022), with the role of datafied systems in shaping contemporary higher education minimally discussed and understood in the sector (Williamson, 2015).

When datafication does receive acknowledgement within academia, conversations on benefits often outweigh discussions regarding risks (Avella et al., 2016). While there exists a wide and growing body of literature on critical data literacies and ethics (Atenas et al., 2020, 2023; Brand & Sander, 2020), many campus conversations on data literacy have tended to focus on optimisation or capacity to deal effectively with data-driven systems and learning analytics (Persico & Pozzi, 2015; Wasson et al., 2016). Faculty development in this area, then, has tended to be instrumental rather than critical in focus (Raffaghelli et al., 2020), though there has been some emphasis on the need to develop academics' data literacies so they can ensure fair practices in relation to learning analytics (Tsai & Gašević, 2017). Still, faculty have not generally been, to date, full partners in campus datafication conversations. In order to be full and knowledgeable partners in academic governance, educators need understanding of data infrastructures and their implications.

This article overviews findings from our global CCS of university professionals teaching online during the COVID-19 pandemic. It outlines beliefs and barriers shaping educators' responses to datafication, with a focus on their perceptions of institutional learning and faculty development opportunities related to digital classroom tools and datafication. This study provides insights into how higher education's contemporary datafied infrastructure shapes academic power relations, while highlighting participants' voices about faculty awareness, agency, and critical data literacies through a professional development perspective. Our position is that the absence of sustained professional learning around datafication in higher education fosters data literacy gaps that undermine informed shared governance, serving the academic sector poorly.

Faculty beliefs about datafication in higher education

According to Amundsen et al. (2005), faculty development and academic development can both describe institutional activities and programmes designed to enhance faculty capacity in their roles as instructors, researchers, citizens and scholars, and thereby to enhance instruction. In this article, we primarily use faculty development as our core term, with some broader mention of professional learning to include non-formalised or non-institutional learning opportunities.

Even prior to the pandemic, higher education had shifted increasingly to a digital, technology-led approach (Bashir et al., 2021). The education sector has experienced

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a substantial increase in datafication, impacting social, cultural, economic and political processes (Williamson et al., 2020a). However, particularly in the aftermath of the COVID-19 online pivot, faculty work in an environment marked by a distinctly datafied approach to pedagogy (Rapanta et al., 2020; Shin & Hickey, 2020; Williamson et al., 2020b). Datafication in higher education can lead to pedagogies focused on performance and measurement, and incorporation of systems that allow students and professionals alike to be quantified and analysed (Williamson et al., 2020a). Developing data literacy for educators is not only crucial (Mandinach & Gummer, 2016; Selwyn & Gašević, 2020) but also time consuming and requires contemporary, continuous professional training (De Simone, 2020).

Raffaghelli et al. (2021) acknowledge that the complex scenario of data use in higher education requires innovative approaches to faculty learning and training. Garraway (2020) highlights the growing literature on how the changing nature of higher education affects the academic workforce, while also expressing concern for how faculty can be assisted in developing data literacies. Schofield (2021) states that despite political, commercial and public consciousness increasing about consequences and ethics of data, analytics, algorithms and artifical intelligence (AI) as a result of data controversies, data focusing on the field of higher education teaching and learning or pedagogy has remained comparatively under-researched.

Current research on barriers to data literacies include increased workload, time commitment, a lack of personal relationship with students, frequent technology failures, inadequate compensation for instruction and time, personal anxiety/fear with technology, inadequate training, inconsistent administrative and technical support, and a lack of skills or confidence in teaching online (Gratz & Looney, 2020; Lloyd et al., 2012; Luongo, 2018). However, our position is that the onus of responsibility to develop data literacies should not fall solely on the shoulders of higher education professionals, but rather, on their institutions and the sector as a whole. Educators cannot become fully data literate on their own, but need preparation (Mandinach & Gummer, 2016). Initiating and engaging in conversations on datafication in higher education can support development of critical data literacies (Pangrazio & Selwyn, 2019). Rodés et al. (2021) posit that a critical digital pedagogy approach is essential to designing sustainable professional development models that question the neutrality of pedagogy and technology. This approach grounds our project's assumptions about the development of data literacies. Establishing and fostering adequate connections between professional development and classroom practice may result in professional development providers being able to embed elements in the experience that heighten participants' interest in the topic of data literacy, hopefully resulting in a substantial amount of change to their classroom practices and digital pedagogy (De Simone, 2020). However, Bali and Caines (2018) observe that faculty development is often one-size-fits-all, failing to address individual concerns and often inaccessible, schedule-wise, to educators with family or volunteer responsibilities.

Faculty in higher education institutions hold complex roles, requiring them to adapt and implement additional expectations, skills, and understandings in their pedagogy (Garraway, 2020; Spilker et al., 2020) that reflect digital shifts. Wells (2016) acknowledges that the expansive range of higher education knowledge workers integrating and implementing datafied platforms into their pedagogy are often weighed down by the quantity of other duties they must fulfill in their roles as faculty. A study by Pierson (2001) found no correlation between technology expertise and teaching expertise, emphasising that exemplary teaching does not always translate into effective

technology use. Ferguson's (2004) literature review asserts that effectual teaching requires a combination of teaching and technological expertise, indicating that teaching and technology have become increasingly co-dependent over recent decades (Pierson, 2001; Woodbridge, 2003, as cited in Ferguson, 2004).

Methods

We chose qualitative CSS as a method for our investigation of educators' data perspectives and how they develop them. The CSS was designed as a follow-up to the principal investigator's (PI) 2020 pilot survey that examined educators' perceptions of datafication during the 2020 COVID-19 online transition. That survey's four proxy questions determined that the majority of educators responding had limited knowledge or practices related to datafication (Stewart & Lyons, 2021). Survey results generated further questions about how practices and understandings related to datafication are shaped within higher education settings, and whether there are common perspectives on what institutions should do with regard to the data generated by digital classroom tools. The CCS study emerges from those questions.

Methodologically, CCS centres on analysis and synthesis of similarities, differences and patterns across examples or cases of a specific circumstance. As Bartlett and Vavrus (2017) notice, CCS attends simultaneously to multiple levels of analysis and engages multiple logics of comparison, including tracing across sites. Our choice to engage in a CCS stems from our interest in looking at commonalities and patterns among educators from different cultural and academic contexts. Tracing of shared understandings is the dominant theme in this article, rather than to compare and contrast, or more conventional case study's efforts to optimize understanding of a single case (Stake, 2008). The CCSs can facilitate understanding of how and why particular phenomena of interest operate and are influenced, across contexts (Bartlett & Vavrus, 2017).

The project was reviewed and approved by the Research Ethics Board of the University of Windsor. The PI designed a semi-structured interview protocol investigating the four proxy categories of questioning in further depth, as well as a Field Notes instrument, which enabled participants to track similar threads of inquiry in writing and/or with screenshots from their own practices and institutions. Semi-structured interviews with participants explored educators' practices, knowledge, experiences and perspectives in the context of their work in higher education prior to and during the pandemic. The Field Notes element of the project allowed for written reflection on, and visual tracing and verification of communications related to datafication, offering an additional layer of investigation.

The CCS involved 11 participants: 8 women and 3 men, located in 6 countries: the United States, Mexico, Ireland, Scotland, Saudi Arabia, and Canada. All three men were Associate Professors, in the faculties of Engineering, Computer Science, and Business, respectively. The women participants included one Associate Professor, two Assistant Professors, one Lecturer (UK designation equivalent to an Assistant Professor in North America), one Learning Technologist, one Coordinator of a Teaching and Learning Centre and part-time instructor, one Programme Coordinator teaching within her own programme, and one Adjunct Professor. The women taught in faculties of Law, Arts, Science, Nursing, and Education as well as in faculty development.

Braun and Clarke's (2006) reflexive thematic analysis consists of data familiarisation, coding, thematic extraction, reviewing themes, and naming themes. Researchers

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began to code the data set using this approach once interviews and field notes were completed, and interviews were transcribed. Reflexive thematic analysis is an accessible and flexible interpretation to approach qualitative data analysis by facilitating the identification and analysis of patterns or themes in each data set (Braun & Clarke, 2012; King, 2004).

The team collated the interview transcripts into one document, to clarify auto-generated transcripts. Researchers manually checked the data for themes, selecting specific quotes and highlighting key themes across transcripts. We then uploaded the combined participant transcripts to the qualitative data analysis software Dedoose to begin the second step of Braun and Clarke's (2006) thematic analysis: coding. Thematic analysis is an appropriate method of analysis for seeking to understand experiences, thoughts, or behaviors across a data set (Braun & Clarke, 2006; Kiger & Varpio, 2020; King, 2004). After revisiting the interview transcripts in Dedoose, we used the software to highlight excerpts and quotes showcasing commonalities in data perspectives. Key themes that emerged were that regardless of participants' familiarity and comfort with datafication, faculty were very aware of barriers created by datafication in higher education and had strong beliefs about what institutions should do about data. Another key theme that emerged was the role of professional development opportunities in helping educators adequately address and stay informed on datafication.

The team of researchers then discussed the codes that emerged during this step of the process to engage in thematic extraction and reviewing themes. For the fifth step in reflexive thematic analysis process, we used Dedoose to name overall themes and sub-themes, and used Miro, a visual collaboration platform, to reflect themes and subthemes in a visual representation. This step finalised the themes and allowed each researcher to engage in relating the analysis to preexisting literature.

Participants' voices: findings on data literacies and professional development

Our study indicates that, despite the implications for both the educational sector and for faculty members and students, higher education institutions tend not to address digital and data literacies directly. Participants expressed strong beliefs about their opportunities for professional development in digital and data literacies, and the structural and institutional barriers that they face in developing new digital skills.

When asked questions related to professional development and how faculty learn about digital tools within their institutions, participants often acknowledged significant efforts made during the pandemic, though their institutional experiences varied broadly. When participants were asked what kind of digital faculty development opportunities they had found most impactful during the online pivot, their answers tended to be faculty development that was pedagogical and experiential, related to their actual teaching contexts. Most participants reported they needed to understand the possibilities of platforms and systems, preferring a focus on how to implement the tools with just-in-time support available for technical details:

> A big push by tech support staff broadly to put together resources, creating videos … so, tutorial videos on how to use different things. Knowing that there's an official place where it's okay to ask questions. If there's something going on in the LMS I can put in a support ticket. If it's a quick thing, I can just put a question on that Teams chat. (Cardinal)

> We just get told we're using the system now, and this is how you look at the analytics and that is it … [it should be] different learning activities that we could do and how you can implement that using the tools, rather than just focusing on what the tool does. Because we were signed up for it as a kind of course, we were students. We could see the tools working from the student side. That was really useful. (Susana)

> I was trying to do full-time childcare during the days … so mostly my workday started after 8PM. But I would often do a couple hours during the day and I would carve aside time to attend some workshops on how to navigate online stuff. But like the time that I did one for Teams, and then at the very end of our workshop, I found out that you can't see more than two people or four people on a screen. So it was useless to me. (Kelly)

Though most participants were less interested in being told what systems to use or how to operate them technically, some expressed a desire for direct technical instruction in addition to pedagogical faculty development. Generally, faculty did not want to know more about the tools per se, but how to use the tools to better serve their students:

> Pedagogy is important and it needs to be sort of the primary consideration, maybe also looking at the affordances of technology. (Claire)

> So there were some trainings, but much more 'be considered and be flexible and just engage with your students online like you would in the classroom'. So a whole lot less of the functional training and things like that, but more of the try to emulate what you do, and know that we're here to support you, which was nice. But, but, more of the pedagogy than the actual what to click when? (Jason)

> The institution offered multiple workshops all across the summer to help people prepare to get ready, even to know how to load your materials onto it [system] … There was a lot that was offered. The problem with that … everybody's completely burnt out by then and trying to learn something new … I'm so done with workshops. I can't. If I have to do another workshop, I'm going to shoot myself in the face in front of the Dean. (Jangle)

Additionally, overload and uncertainty about what training options to engage in was reported as an issue, particularly during the intense online pivot period of the pandemic:

> What we've heard on the Teaching & Learning Technology Committee was there's too many options. When people didn't have enough experience to even know how to make a decision, a decision matrix doesn't help. (Cardinal)

In terms of data policy and datafication, most participants reported minimal focus on data in relation to digital tools training. Educators generally didn't feel included in campus data conversations, even where they wanted action at the institutional level to protect student privacy. Participants paying attention to campus data policy found it poorly communicated:

> I don't think it's happening enough at my university. It's probably happening at individual levels and not in a manner that is systemic. (Ahmad)

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> Where the training has been really good is in terms of getting faculty up to speed on how to use the systems … they did a really good job … But no discussion about the actual data collection implications. And I've actually asked the question, how can students and staff opt out of data collection practices in Canvas? (Wayne)

> I'm not aware of a lot of conversations about privacy of student data. I think we're pretty ignorant collectively. (Cardinal)

> One of those small courses I took this last summer was on data literacy and privacy and all of these issues in whichever LMS we're using. And it was kind of amazing how much wasn't very clearly available for my institution … the assignments ask you, can you find this information on your institution's website? And many times the answer is null, or it's hidden somewhere, or it's relatively inaccessible. (Denise)

> There's lots of talk about data literacy, but not a whole lot of action as of yet. As far as I'm aware about data literacy, you can take a course on cybersecurity. You can take some mandated stuff on privacy. But as far as for faculty and for administration to develop data literacy, very, very little. (Jason)

> They feel like they tried to keep teaching staff out of [the conversation] because they assume that we don't care, or we don't have the time … which is fair. (Susana)

Participants highlighted generally that data are seldom explicitly discussed on their campuses, sometimes because there is the expectation that the responsibility belongs to others or their institution:

> At this point it's above my paycheck to worry … someone else has worried about this, I hope. (Ilse)

> …Practically I don't want to read that shit. (Jangle)

Participants whose work intersects with educational technologies tended to express particular awareness of data as an issue, though with limited access to policy conversations and decision-making on their campuses. Most were working to mitigate data risks for students and staff, in their professional practices:

> I was that guy who had a Moodle server underneath his desk and used it for my classes in 2001. And then faculty said, Hey, can you host mine? … I had control and I know that no one else has taken data out and I can just delete it myself. But then … we've got to be careful of the cognitive overload of our students and they're using six different platforms for their six different classes. And so I've migrated to this standard system and I should use the templates … But now it leads me to thinking, do I go off the rails again and run my own systems? And then it also means that I probably need to push harder and ask administration in my university system what's going on with this data. (Wayne)

> I think faculty should have access to their own data … just philosophically, I think that makes total sense. I am cautious about who within administration should have access to that data. And I want it to be used for specific purposes,

> not just for a fishing expedition or in disciplinary type stuff … Like, you know, 'you're using Moodle differently' and so that can get you into trouble kinda thing. Or 'you're not using Moodle' and that can get you into trouble because they want you to. There would be some issues around academic freedom. (Claire)

One participant had state-mandated information literacy training that proved effective, in that it made her aware of her own limitations and kept her paying attention. This model might be a professional development option that more jurisdictions might want to consider:

> Being a state employee, even though it's a contingent position for me, I have to do basically an information literacy training every year mandated by the state. It's all about not falling for phishing, keeping your data secure. And they'd send emails to see if you fall for them. And I actually did fall for one and had to retake a refresher training testing. … To fail one of their tester emails was like, 'Oh, see, I think I'm never going to fall for that. I know all this, you know, whatever, I'm very good at checking for spam and assessing it'. But then there was at least one. So it was humbling. And I think it's effective. (Denise)

Participants generally demonstrated strong beliefs that there should be clear boundaries around what happens to student data:

> Our data's very tightly controlled here, which I suppose on one end is nice, then on the other end is extremely frustrating. The for-profit side, I have a whole lot less bandwidth for that. I don't want non-anonymized data. I'm not sure that that's in anybody's interest. Turning that into a profit-seeking opportunity for something that is government-supported as a not-for-profit to begin with. There are better ways to seek funds than to sell data, I think, especially when selling data can be very risky. (Jason)

Overall, encouraging transparency and communication about the data implications of digital classroom tools was a desired outcome for participants. Participants working in faculty development were actively considering how to scaffold datafication conversations for educators:

> What we could do better is that when we are offering workshops, offering things around certain tools, is we need to highlight [data] and maybe it might sound boring and maybe folks don't listen through it, but … talk about how [tools] are GDPR compliant, their LTI integration is safe, when I've done the purchasing, I fully checked all their data and privacy, you know … I don't know if we always embed that into conversations. So maybe we do need to really look at something specialized, even just around a suite of things that are available. (Fiona)

Participants named various barriers at personal, institutional, and structural levels to keeping up with datafication issues in higher education, but in all cases, limited communication and limited professional development within campus communities was a factor. These findings indicate that faculty in a variety of roles are experiencing limitations to full awareness and agency with regard to the datafication of their professional sector and its learning spaces.

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Discussion CCS analysis involves three separate comparison lenses: horizontal, vertical, and transversal comparison. The horizontal lens traces similarities and differences between individual participants (Bartlett & Vavrus, 2017; do Amaral, 2022). Regarding professional/faculty development, 8 of our 11 participants noticed minimal formal institutional opportunities to learn about datafication. Some specifically mentioned that they feel excluded from these conversations – or the tables at which they occur – within their institutions. However, those involved with technologies through personal interest or title were more informed about datafication, generally. In terms of faculty development, majority of participants overtly preferred practical sessions teaching them how to use tools to benefit students. Some preferred big picture foci such as implementing effective lessons or making the online classroom engaging, while others wanted help in the moment with specific challenges. One educator whose focus was primarily on tool use came from a business school background, which may foster greater focus on efficiencies and technical optimisation, though that faculty member was nonetheless interested in pedagogy. Ultimately, no one-size-fits-all approach to successful digital faculty development emerged from the data.

The vertical dimension of CCS traces phenomena across scale, allowing for analysis of socially produced connections between individuals and structures (Bartlett & Vavrus, 2017; do Amaral, 2022). Structurally, across the variety of international contexts represented in this study, institutional approaches to digital and especially data literacy faculty development appear generally unsatisfactory. Educators, as individuals, are not finding opportunities within the structure of academia to learn about the big picture of how datafication is changing classroom tools or their institutions. This means that a profession based on knowledge is unable, even in the primary site of formal cultural knowledge dissemination, to acquire the knowledge needed to engage with datafication from an expert position. Essentially, higher education faculty are being socially produced *by* their professional sector as non-knowers, in relation to the increasingly digital and datafied infrastructure of that sector. This represents a significant shift in the professional power structure of academia. Thus, a key call to action emerging from this study is that educators and higher education professionals should demand that their campuses foster learning and conversations about datafication. The experience of teaching online during the pandemic afforded participants the chance to engage in digital faculty development and learn what worked for them, but many experienced overwhelm and frustration, which may have limited their openness to further formal sessions related to datafication. And yet, learning opportunities are clearly required, and would result in a more informed and agential cadre of educators and, ultimately, students. This is a problem that institutions need to address as digital and datafied systems become increasingly complex.

The transversal lens of CCS tends to be historical, situating analysis in power relations of time and space (Bartlett & Vavrus, 2017; do Amaral, 2022). It is imperative to remember that digital faculty development is relatively new. The disconnects that the study makes visible between what educators find meaningful and what is on offer, and the failure to empower educators in relation to datafication, reflect shifting power relations in neoliberal 21st century institutions. Our study makes clear that this is a pattern visible in a range of geopolitical contexts, and that it impacts educators at all levels of academic role.

Conclusion

Overall, findings from our CCS of university professionals teaching online during the COVID-19 pandemic indicate limited professional learning around datafication in higher education, even during extensive digital faculty development. Participants, including individuals responsible for educational technologies at their campuses, consistently acknowledged a lack of open discussion regarding data and its implications. It was evident that educators' data literacies are not being fostered by current training approaches or by campus datafication conversations. This leaves educators few opportunities – at least within institutions – to develop contextual and critical data literacies relevant to their profession. This, in turn, undermines faculty capacity to teach students about data privacy and to engage as knowers in shared governance of a sector with highly datafied digital infrastructure.

We consider this reality both serious and urgent and suggest that higher education focus on avenues and paths for educators to engage in digital and data literacies development. Bali and Caines (2018) propose connected faculty development rather than technical, emphasising the educator as learner and providing material based on what educators want to know. This type of faculty development approach is one recommendation emerging from this study, as it would provide space for faculty to discuss and reflect with one another about their practices and their understandings, potentially offering space for critical data literacies to emerge. Beyond connected faculty development focused on data literacies, however, a broader recommendation emerging from our research is that educators band together to demand sector-level conversations about the implications of datafication. Without engaging in this professional learning about their changing sector, faculty risk ceding their role as knowers within the academic context.

Recommendations

In addressing contemporary power contexts and the urgent need for just transformations, Lincoln in Denzin et al. (2017) states the need to address policy issues using qualitative research. In this study, we have drawn on critical qualitative methodologies to make visible the limited opportunities for critical data literacies development among higher education faculty. Moving forward, we call for both formal faculty development and broader professional learning conversations as a means of enhancing faculty awareness and agency within the higher education sector.

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