

Critical Data Studies, Abstraction and Learning Analytics: Editorial to Selwyn's LAK Keynote and Invited Commentaries

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Abstract

This editorial introduces a special section of the *Journal of Learning Analytics*, for which Neil Selwyn's keynote address to LAK '18 has been written up as an article, "What's the problem with learning analytics?" His claims and arguments are engaged in commentaries from Alfred Essa, Rebecca Ferguson, Paul Prinsloo, and Carolyn Rosé, who provide diverse perspectives on Selwyn's proposals and arguments, from applause to refutation. Reflecting on the debate, I note some of the tensions to be resolved for learning analytics and social science critiques to engage productively, observing that central to the debate is how we understand the role of *abstraction* in the analysis of data about teaching and learning, and hence the opportunities and risks this entails.

Keywords

Critical data studies, sociotechnical systems, politics, ethics, abstraction, formalization

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1. Introduction

The learning analytics (LA) community has sought from its earliest days to engage constructively with sister disciplines and communities. At least this is true of the community represented by the Society for Learning Analytics Research (SoLAR) and the networks that have grown up around SoLAR's annual International Conference on Learning Analytics & Knowledge (LAK), shortly to mark its tenth anniversary. Indeed, to behave otherwise would be disrespectful in the extreme, standing as we do on the shoulders of numerous, longer-standing academic fields. These include computer science (artificial intelligence (AI), information retrieval), statistics and data science, the learning sciences, education (assessment, pedagogy, instructional design), educational technology, human-computer interaction (HCI), information visualization, and numerous others whose relevance is being recognized. The field cannot afford to reinvent conceptual wheels that have arisen in other communities through rigorous research but must configure them in new ways, inventing new ones where required. Engaging deeply with critical perspectives is, and should remain, a hallmark of the field, or it will stagnate.

When planning the LAK '18 conference, we saw a turbulent academic and commercial landscape taking form around us. With the rise of "big data," cloud computing, and machine learning, both the mainstream media and academia have witnessed an explosion in debate about the societal impact of data and algorithms. Although with mature intellectual roots, one of the newer fields to emerge has been coined critical data studies (CDS; e.g., Boyd & Crawford, 2012; Dalton & Thatcher, 2014). Iliadis & Russo (2016) introduce CDS as follows:

The nascent field of CDS is a formal attempt at naming the types of research that interrogate all forms of potentially depoliticized data science and to track the ways in which data are generated, curated, and how they permeate and exert power on all manner of forms of life. (p. 2)

They go on to say:

...the subjects of CDS are the sociotechnical "data assemblages" that make up Big Data. The apparatus and elements of a data assemblage may include systems of thought, forms of knowledge, finance, political economy, governmentalities and legalities, materialities and infrastructures, practices, organizations and institutions, subjectivities and communities, places, and the marketplace where data are constituted. (p. 3)

While LA (and its cousin AIED (artificial intelligence in education)) are committed to improving the formal education system and other modes of lifelong learning — a social good compared to more overtly sinister applications of AI/big data — this in no way elevates these fields above such critiques. Raising the stakes sharply, the last decade has seen LA explode from a nascent research field to a very serious educational technology business, with hundreds of millions of students having their activity logged in cloud-based platforms. Naturally, these are marketed to institutions — or “given away” to governments as national infrastructure — with the well-funded hype accompanying products surfing the new data/AI wave, leading inevitably to LA and AIED also surfing the Gartner (2019) “hype cycle.” As overinflated expectations are dashed, our research communities inevitably reap some of the backlash from a media, public, and academics who do not distinguish between tools powered by research and those powered by snake oil. Furthermore, there is “the dark side” of data to contend with. Post-Snowden, post-Cambridge Analytica, society is quite rightly scrutinizing analytics-powered platforms, and data ethics literacy is increasing through the almost daily mainstream media coverage of algorithms, AI, and privacy/data breaches.

LA is now the subject of continuous, critical academic commentary (e.g., Jarke & Breiter, 2019; Williamson, 2017). While many academic fields might not care how they are perceived by their academic peers, LA does not have that luxury. These tensions come with the territory of working in a field that has immediate and direct consequences for huge numbers of learners and educators, and we cannot afford to ignore how our work is (mis)understood by educational policymakers, practitioners, and citizens at large. Teachers’ unions, parents, and students are already protesting against what they perceive to be “AI experimentation” on students (cf. Gavrielatos, 2019; Strauss, 2018; WeTheEducators, 2019). The fact that concerns run this deep emphasizes the need for mutual learning about how we shape the future landscape together.

This was the context in which we set the theme for LAK ’18 as “Towards Human-Centred Learning Analytics” and decided that the community would benefit from hearing how our field shapes up when viewed through a critical, sociotechnical lens, enabling us, in turn, to reflect on the rigour of the critique, and of our responses. We were therefore delighted when Neil Selwyn accepted our invitation to deliver a keynote (which can be replayed: Selwyn, 2018), given his track record of academically informed critique on educational technology research and practice. His address provoked strong reactions from delegates, from the enthusiastic to the dismissive, motivating this special issue to provide space to explore the arguments in more depth. Selwyn (2019) has written his talk up as an article, and following the format used so effectively in other journals, this is responded to in commentaries from four members of the LA community, Alfred Essa, Rebecca Ferguson, Paul Prinsloo, and Carolyn Rosé, selected for their diverse expertise and familiarity with the field.

We know from our lived experience in academic communities that we can be resistant to external critique. This may be justified if the critiques are flawed, but the ideal to which we aspire is that there is no place for uncritical defensiveness in the academy. We are therefore grateful to Selwyn for accepting the invitation to share his critique, despite some risks. Prinsloo (2019) draws our attention to Selwyn’s (2019) opening statements, in which he positions himself as the outsider:

In jokingly saying “You have to start to engage with idiots like me,” Selwyn seems to assume the role of the jester, the savant-idiot and the idiot-savant who in the blasphemous hilarity of a Medieval carnival could comment on sacred and profane structures, beliefs, and institutions.

Playing this role is courageous. While not being an “insider” means one can ask apparently naive but poignant questions in order to expose blind spots, a lack of familiarity with the community can leave the framing of questions low on detail, with the risk of dismissive rejection from insiders. Thus, the “jester” persona cuts both ways. You must draw your own conclusions as to whether you agree with Prinsloo that in his outsider role Selwyn questions some LA sacred cows incisively from unexpected angles (which can hurt) or overgeneralizes rather bluntly (leaving us to wonder if this is only in jest to provoke debate). Whatever you conclude, I think that in his proxy role as the concerned citizen, educator, and policymaker looking in, Selwyn conveys with great clarity how our work can be misunderstood.

In the remainder of this introduction, I first make a few observations about how LA and its social science critics could engage productively, before discussing the nature of *abstraction* as an overarching issue to emerge in the commentaries.

2. On Social Science Critiques of LA

Sociotechnical critiques in the tradition of science and technology studies take an anthropologist’s delight in problematizing taken-for-granted assumptions in the computational communities, often by demonstrating how socially naive their assumptions are, using forms of analysis in which the computing sciences are often illiterate. “Making the familiar strange” in this way can be insightful for some, but also frustrating if, ultimately, there seems to be only deconstruction without reconstruction. Moreover, while social scientists (and their arts and humanities colleagues) are not under any obligation to resolve the tensions they identify, ultimately, we do not have that non-interventionist option if LA is to be relevant: we are educational infrastructure designers who bake assumptions into code, deploying robust systems with real teachers and students and recommending effective work practices for using these tools. It doesn’t get more interventionist than that! So while critique and deconstruction are intellectually vital, our colleagues in critical data studies

can perhaps also learn from their sociological colleagues who experienced a “turn to the social” in computer-supported cooperative research (CSCW)/HCI (e.g., Button & Dourish, 1996; Randall & Rouncefield, 2014). Over the last 20 years, this community has discerned the practical roles they can play to *actively assist the design process* on realistic time scales. What does this look like for our community?

On this note, all four commentators recognize the constructive set of recommendations with which Selwyn (2019) concludes, but I would, however, take issue with one of his conclusions:

As the development and implementation of learning analytics technologies increasingly become the preserve of large-scale commercial interests, there is diminishing need for academic research or university “R&D” in this area. University academics may have played a leading role in establishing the concept of learning analytics but are increasingly less involved in the development, production, implementation, and use of the products. (p. 18)

From somebody so critical of commercial players, such a proposal was surprising to see. I would argue that on the contrary, we cannot leave the technology development to the companies. It is more critical than ever that academic research teams continue to develop research prototypes as a corrective to much of what is currently marketed as “analytics dashboards,” with little or no apparent grounding in pedagogy (cf. Jivet, Scheffel, Specht, & Drachsler, 2018). Regardless of how well intentioned or theoretically grounded our LA aspirations are, we must be able to implement them as *running code* using *real data*, creating a compelling *user experience*, with *benefits* for learners and/or educators. The LA field is called on not just to critique poor design, or to envision future design, but to show the vendors — and open-source consortia that may service education equally well, if not better — what is possible in software.

What is possible in software leads us to an overarching theme to emerge from the many issues raised in the five contributions: *abstraction*.

3. Abstraction

At the heart of the “A” in LA is abstraction: quantitative data, formal models, statistics, knowledge representation, and machine learning, serving up a dazzling array of computational techniques tuned to different forms of human communication (speech, text, posture, movement, gesture, facial expression, etc.). Until relatively recently, these modalities have been the preserve of human interpretation, or AI research demonstrators in the labs, but increasingly these are commodity tools through the convergence of cheap multimodal sensors, and an array of cloud computing services that can be bought by the second. How these work is opaque to many outsiders, provoking understandable anxieties. One response — for layperson and scholar alike — is to hold to versions of what is essentially an article of faith, namely, that no matter how powerful the technology becomes, it will never be able to model human cognition and social reality in all its complexity. This ensures that there will always be a human/machine intelligence gap to critique (and, comfortingly, preserves our intuition that there is something that sets us apart from machine intelligence).

While Ferguson and Prinsloo are happy to support Selwyn’s claims about the inextricably reductionist nature of quantification, Rosé and Essa are not ready to let this pass. Rosé (2019) counters Selwyn’s evident suspicion of abstraction, pointing out that this happens in every discipline, including the qualitative: “The fact is that as humans we have limited attentional capacity, and thus we must reduce in order to comprehend” (p. 25). She draws on her extensive work on “multivocality” in the learning sciences to call for those holding disciplinary lenses from across the quantitative/qualitative spectrum to find ways to work productively together, to expand the angles and filters available to make sense of data.

Essa (2019) goes further, introducing us to Borges’s allegorical story *Funes the Memorius*:

Borges’s tale can be read as a *reductio ad absurdum* of the romantic view that true knowledge is wholly subjective, wholly particular, and wholly experiential. (p. 28)

In this sense, Essa casts Selwyn as an “educational romantic” who

embraces the immediacy and concreteness of lived experience but is loath to move beyond it. [...] Selwyn’s blithe romanticism explains statements such as, “There are not enough data points in the world to adequately capture the complexities and nuances of who a student is ... or how a school or university functions.” (p. 28)

Neither Essa nor any other commentator doubts this, but Essa strongly rejects the simplistic equation that *statistics* = *reduction*, presenting several examples of how statistical abstraction sharpens rather than blurs understanding. However, these will be unfamiliar to those from fields that do not wield statistics as a tool, who may struggle to understand them. Herein lies the need to build mutually respectful common-ground, safe space for each discipline to emerge from its comfort zone, ready to learn. Promising signs of this can be seen in the Fairness, Accountability, Transparency community (e.g., FAT*, 2019); the approach of “quantitative ethnography” (Shaffer, 2017); and recent “insider accounts” from

researchers/developers of analytics/AI-powered learning tools, documenting how they make design decisions that make value commitments (Buckingham Shum & Luckin, 2019).

To what extent does Selwyn's (2019) critique shed new light on, or expose blind spots in, the LA field's work on ethics? His emphasis on the dark side of data does not pass without comment. While all commentators recognize the potential for poor uses of data, they resist any notion that it is *intrinsically* "dark," which at times seems to be Selwyn's position, in statements such as this:

We need to challenge the idea that learning analytics is a neutral tool that can be used in any way – for good or for bad, wisely or carelessly, effectively or ineffectively. (p. 12)

This motivates his conclusion that we must "give much more thought to the ideologies and politics of the technologies that we find ourselves using" (p. 12). However, in the commentators' view (and my own: e.g., Knight, Buckingham Shum, & Littleton, 2014), this is a clarion call to better understand how sociotechnical infrastructure propagates ideologies (intentionally and unintentionally), but it is not an essentialist argument of any sort.

Thus, Ferguson (2019) calls for balance: "Data can be used to entrench the status quo; data can also be used to expose inequalities" (p. 19). She provides examples, as does Essa, showing how data help us identify uncomfortable truths about educational inequity, at the macro-level of different socioeconomic groups in the U.S., and at the micro-level of skills mastery enabled by intelligent tutoring systems, regardless of a student's starting point. The heart of Ferguson's commentary is a helpful reading of Selwyn through the lens of six broad headings that the LA community identified in 2016: "duty to act, informed consent, safeguarding, equality and justice, data ownership and protection, and privacy and integrity of self" (p. 17). She notes which of these Selwyn does not discuss, as well as points where his arguments highlight the need to deepen thinking. Fundamentally, she concludes that researchers and practitioners who form the "LA ethics community" are well aware of his concerns and are addressing them to varying degrees. This of course does not imply that the whole field has that level of awareness. Moreover, Ferguson recognizes where Selwyn's critique adds new insight and revises the formulation of the six challenges accordingly.

To summarize, within the limitations of his keynote article, Selwyn hints at, but does not substantiate, a more essentialist argument that data/analytics/AI infrastructures *necessarily* entail reductionist commitments that the LA community would consider counterproductive to good learning and teaching, because it is a delusion to believe that LA can be used "for good or for bad, wisely or carelessly, effectively or ineffectively" (Selwyn, 2019, p. 12). Other authors, such as Williamson (2019), have set out in more detail similar concerns to Selwyn's around the datafication of education, with its dark side quite apparent when those in power wield the tools in ways that appall us. Again, however, there are more emancipatory stories to tell, in which LA tools provide valuable feedback to learners, building competencies in ways that educators are delighted with. Nor should the question of data's *essential neutrality* be confused with claims that a *specific* infrastructure or tool is neutral or objective, which is not an argument that any commentator advances. In my view, data, analytics, visualizations, automated actions — all are *designed* — and reflective infrastructure designers are acutely aware of the implications of their work. Significantly, they are beginning to document how they navigate the dilemma of designing with imperfect technology (e.g., Johanes & Thille, 2019; Kitto, Buckingham Shum, & Gibson, 2018; Richards & Dignum, 2019). It seems to me, therefore, that to declare that LA infrastructure has *intrinsically* destructive cognitive, social, educational, or political affordances is no less than a capitulation to the status quo, handing over the reins of these new tools to those with much power, but less understanding of learning and teaching. It may indeed be the persistent *experience* of disempowered constituencies that these infrastructures are intrinsically destructive, but the appropriate response is to give these stakeholders meaningful voices in shaping the conception and design of the tools (e.g., see the recent *JLA* special issue on this topic: Buckingham Shum, Ferguson, & Martinez-Maldonado, 2019) and to change the policies and practices that incentivize how such tools are conceived, sold, and mined for value.

On these grounds, to all intents and purposes, the tools of quantitative abstraction at the heart of LA have no essential moral status: they have inertia without doubt, but they are products of the human imagination, and that is malleable. These tools endow powers that can be harnessed to realize many agendas. LA may reduce structural inequalities in society, or exacerbate them, but a critical systems approach should provide ways to anticipate this. LA design teams need to learn to think in terms of the ripples that their inventions create at multiple levels of the sociotechnical infrastructure that constitutes "education." To do this, there is no question that LA needs constructive, critical, social analysts of data infrastructure, who bring valuable methodological lenses that render these ripples visible. In sum, far from denying that power is mediated through educational infrastructures — often to the detriment of the teaching profession and students' deeper learning — a focus on human-centred, sociotechnical systems design *refuses to accept that this is inevitable* and should provide the tools to demonstrate how to create alternative educational realities.

4. Conclusion

The "slow dialogue" in this special section provides the opportunity for deeper reflection on Selwyn's keynote. Responses

to sociotechnical critiques of LA are beginning to appear, primarily for researchers (e.g., Buckingham Shum & Luckin, 2019; Ferguson, Hoel, Scheffel, & Drachler, 2016; Porayska-Pomsta, Woolf, Holmes, & Holstein, 2019) and policy audiences (e.g., Corrin et al., 2019), but there are few resources explaining the issues to school and college/university teachers, or principals, parents, and students, equipping them to ask critical questions and hold institutions, researchers, and educational technology vendors to account. For research-informed designers interested in improving their design methods, bridges are being built with longstanding human-centred design practices (e.g., Buckingham Shum et al., 2019), and one hopes that such practices will start to be embedded in the training of data scientists and LA/AIED teams.

I note in passing that this commentary format is in fact little different from the letters scholars have exchanged since *Journal des sçavans* and *Philosophical Transactions of the Royal Society* were founded 350 years ago. The emergence of electronic journals over the last 20 years demonstrates how one can curate online scholarly discourse closer to Socratic dialogues (e.g., Buckingham Shum & Sumner, 2001; Harnad, 1996) — and perhaps *JLA* will experiment with such digitally native formats.

I trust that you will enjoy immersing yourself in the arguments and counterarguments. I am grateful to all five authors for creating this collection, yet acutely aware that this is the tip of the iceberg. The opportunities for LA to improve education are both exciting and daunting — and as has already been seen in failed analytics initiatives such as inBloom (Bogle, 2014; Bulger, McCormick, & Pitcan, 2017), the iceberg of ethics can take ships down through pilot hubris. I hope that you are spurred by these exchanges to advance the debate. Beyond academia, as a community we need to think creatively about how to engage the very different stakeholders who need to be welcomed to this conversation.

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