

Patterns in Practice



Cultures of data mining in higher education

A work in progress report from Patterns in Practice:
cultures of data mining in science, education and the arts

Itzelle Medina Perea, Jo Bates, Monika Fratzczak,
Helen Kennedy, Erinma Ochu

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Background

Algorithms that identify patterns in, and learn and predict patterns from, datasets play a growing role in practice across sectors. While many data scientists believe these 'AI' (Artificial Intelligence) systems and technologies are likely to deliver new insights and efficiencies, some practitioners view them as overhyped and with the potential for negative material consequences. These perceptions are shaped by practitioners' beliefs, values and emotions. Understanding these factors is crucial to unravel the adoption and application of such algorithmic technologies in different contexts, including how practitioners engage with them. Ultimately, these beliefs, values and emotions shape practitioners' ethical considerations and preferences in using - and not using - such technologies. This work in progress report shares early findings from research we conducted exploring these issues with Jisc¹ and universities in England and Wales.

Who we are and what we did

Patterns in Practice is a research project funded by the Arts and Humanities Research Council (AHRC). It explores how practitioners' beliefs, values and emotions interact to shape how they engage with and in data mining and machine learning, techniques sometimes labelled as forms of AI.

We examined these cultures of practice across three contrasting contexts: pharmaceutical drug discovery, learning analytics (LA) in higher education, and arts practice. Here, we report early findings from the learning analytics in higher education case study.

Through our research we aim to develop a foundation for engaging people that work with LA - or the results of such computational processing - in critical and reflective dialogue. Our working assumption is that if we want to contribute to the development of more responsible cultures of computational practice, we first need to understand these cultures of practice.

The project aims to help Jisc and universities to become better informed about how practitioners' beliefs, values and emotions shape how they engage with predictive and descriptive forms of learning analytics in the context of higher education. This will enhance Jisc and universities' capacity to develop best practice guidelines for ethical practice, and HE institutions' ability to make effective and ethical decisions about the adoption and use of learning analytics.

Through exploring the perspectives of practitioners in different roles, we aimed to build a rich picture about what they believe and how they feel about the application of LA in higher education. To achieve this, we carried out interviews and focus groups with staff from Jisc as well as two UK universities. University staff included academic staff from different disciplines, learning technologists, student advisors, and others responsible for the LA system implementation. In addition to this, we carried out interviews with staff from two additional universities who were either engaged in the Jisc learning analytics network or in the process of piloting Jisc's learning analytics systems. All participants from universities have engaged either with descriptive analytics, which can provide insights into a student's learning activities, or predictive analytics, which aims to predict their future academic performance. We recruited a total of 33 participants.

Data were analysed using a combination of thematic analysis (Braun & Clarke, 2006), and close critical reading around key findings. Here we report key themes forming one of the thematic narratives identified through our analysis.

1 Jisc is an organisation that offers digital resources and support for UK education and research.

1. Learning analytics in higher education: recognising potential, avoiding hype

Nowadays, digital technologies are more prevalent in classrooms than ever before, and the use of learning analytics is rapidly expanding. Reports suggest that the LA market will continue growing at a fast pace over the next few years, forecasting that by 2027 it will reach \$37.7 billion (Meticulous Research, 2021). In this context, influential actors such as EdTech companies, policymakers, and philanthropists have promoted the idea that LA has the potential to 'fix' what they believe to be old-fashioned education systems that limit students' potential (Microsoft, 2021).

The findings from our research stand in contrast to the hype that has spread about LA systems. Instead of believing that LA is "magic or [an] easy solution" (lecturer using predictive LA system), the educational practitioners we spoke to viewed learning analytics more modestly. That is, they viewed it as a tool that, if used carefully and responsibly, has the potential to enhance educators' work alongside other practices. For example, a lecturer who regularly uses a predictive learning analytics dashboard provided by their university commented:



The tool is an add-on to your work...there's something wrong if we only use an online tool to get all your information. We need communication...So in my opinion, these are our tools to support our work and do it better...So we have to take care with artificial intelligence, or in particular analytics, as a tool to help us and support our work, not as a solution for all our problems."

— *lecturer using a predictive LA system*

Some practitioners expressed a sense of frustration with the hype developing around LA, which they saw as mainly external to their institutions and tending to overclaim the benefits of these tools. Some learning technologists and lecturers expressed a sense of disappointment about the lack of critical perspectives in the field and believed that more voices are needed to challenge the values and beliefs promoted by EdTech providers and other powerful stakeholders.



But there's a view of like, this is brilliant, it's absolutely fantastic and it's done all of this. And then there's a view of a – there's another set of publications which go, well, it is helpful, it can be quite good in – when used in the right way but [this] view is not quite as upbeat and gung ho as the [other] crowd. So it's not a case of I think data analytics is a waste of time and we shouldn't be doing it. I think we should be doing it, but I think we've just got to be careful about not over-claiming benefits unless we're absolutely, you know, unless the information we've got is absolutely robust. And I think there's been an element of over-claiming if I'm being brutally honest."

— *lecturer using a predicted LA system*

This finding suggests that while some educators acknowledge the potential benefits of learning analytics, their belief systems do not align with those of some private EdTech companies and similar stakeholders. Instead, some educators find the rhetoric promoted by these stakeholders overly optimistic and often misleading, by presenting these tools as a panacea to improve retention rates, increase efficiency, and 'fix' education.



In a nutshell

- Education practitioners we spoke to believe that learning analytics could be a valuable tool for enhancing educators' work, but they are sceptical that this is a "magic" or easy solution to pedagogical challenges.
- Some stakeholders' exaggerated claims about the benefits of learning analytics have caused frustration among some learning technologists and lecturers, because the rhetoric appears disconnected from practitioners' experience of and values regarding higher education on the ground.
- Education practitioners believe that a more balanced and critical perspective in understanding the role of learning analytics in the higher education field is needed.

2. Seeing beyond the data

We found that student-facing education practitioners prioritise keeping students at the forefront of their practice and actively look beyond the data provided by learning analytics dashboards. Some teaching staff said they refuse to look at LA data prior to getting to know students for themselves. Others explained how they refuse to make decisions based primarily on the outputs provided by learning analytics systems, which may be based on data about attendance or engagement with the virtual learning environment (VLE). Instead, they believe it is crucial to be led by their experience and skills, rather than driven by the outputs of learning analytics systems.



The data might make you think there's nothing I can do about this student, it's terrible. But if you're using that in conjunction with your skills as a tutor, you may have other information about that student that tells you that actually it's not as bad as it looks, you know, I know something about it. I still need to have that sort of like human contact with the student. I still need to know who that student is. I still need to say to them if you've got any issues you need to let me know."

— *lecturer using a predictive LA system*

Many student-facing staff tended to feel uncomfortable arriving at conclusions about the future performance of students based only on the probability data provided by a learning analytics dashboard.



I don't think I'd be comfortable using it [the data] like that. I think to do that would be to take almost the hope out of it and the faith in the students that if they're not achieving results at this particular moment and they're going through a lot, that doesn't mean that they can't come back from that."

— *student advisor using a descriptive LA system*

Others expressed concern about the possibility that the use of learning analytics is becoming more important than student-teacher interactions.





It's not to say that learning analytics or predictive learning analytics can't help us in some ways, but there is a really very real present danger that that bit of it becomes more important than talking to people and talking to students. And finding out what motivates them, what their interests are, what they're struggling with, all those kind of things."

— *learning technologist using a predictive LA system*

In general, education practitioners spoke of valuing interactions with students over obtaining insights from LA tools. For them, systems should not replace meaningful conversations or undermine the possibility of developing meaningful and positive student-teacher interactions, and they see learning analytics as a potential threat to these relationships. They believe that these interactions remain essential for understanding students' needs, motivations and learning experience, as well as in ensuring that interventions are tailored to their specific needs and circumstances. Yet, this participant's suggestion of a "really very real present danger" implies not only a challenge for practitioners in terms of balancing where their insights about students come from, but also an assortment of material pressures building up within HE institutions that tips the balance in favour of the insights from LA systems.

In a nutshell

- Lecturers and advisors are uncomfortable and worried about their perceptions of students being driven by the outputs LA systems.
- They believe it is critical to place students at the centre of their practice and see beyond the data provided by learning analytics systems.
- These student-facing practitioners believe that insights provided by learning analytics systems should be combined with practitioners' own experience and skills.
- Education practitioners value student-teacher interactions and believe they remain important for understanding students' needs, motivations, and experiences.
- Given the current institutional context in which LA is being embedded, staying committed to practices that reflect these values is sometimes a struggle.

3. Responsible use of resources

A number of participants believed that at times some developers in the LA sector were developing technology solutions for problems that did not exist in practice. This has generated feelings of frustration with the LA industry, and educational practitioners instead advocate for an LA development approach that is driven by identification of areas where LA can make a meaningful impact within the educational context.



It does reach a point where you're sort of maybe a bit like technology for the sake of it rather than really good teaching, you know, ultimately you want the students to succeed and learn and the question is, you know, are these systems that."

— *lecturer using a predictive LA system*





I think sometimes these new dashboards or algorithms or whatever exist because they can exist, rather than because they're actually targeted at a problem that exists... a solution looking for a problem. So I would like to see some of these new predictive learning analytics interventions really targeted towards problems that – identified problems that do exist. Instead of retrofitting them to problems that are perceived to exist...I find it very frustrating if I'm honest."

— *learning technologist using a predictive LA system*

While there is a shared recognition of the potential benefit of using learning analytics in higher education, practitioners also emphasised the importance of reassessing investments when a tool fails to meet expectations.



I really think we do need to get into technology, technological innovations, quickly because of who we are but if it stops working we have to get out just as quickly. So you don't keep putting money into something that's not working. But of course when people have invested a lot of money there's always a temptation to keep investing."

— *lecturer using a predictive LA system*



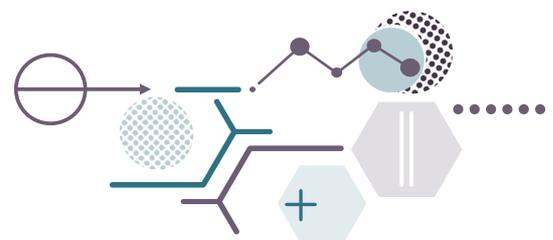
Maybe you should keep some decision-making away from the machines. And it's about knowing that break... And a lot of this stuff is stuff that we're learning as a sector because as we try and become more data-driven, we learn where we need to put the fire breaks in."

— *Jisc and former employee at an institution that had used predictive LA*

These quotes point to the complex material and economic reality underlying the development and adoption of learning analytics in HE; a material reality that works hand in hand with the rhetoric about their adoption discussed above.

In a nutshell

- Education practitioners believe that some LA developers are creating technology solutions without a clear problem to solve, leading to frustration among practitioners.
- Practitioners advocate for a more targeted approach, using these LA tools to address specific problems identified by educational practitioners.
- They also value the need for careful investment assessment and decision-making in the implementation of technology-driven solutions.



What's next?

Data analysis and findings sharing: Over the coming months, we will continue analysing the data we have collected and an end of project report for each case explored will be published in mid 2024. We will also be working on a number of papers that will be submitted to academic journals for publication in 2024.

Practitioner and public dialogue events: To facilitate the sharing of knowledge, in late 2023/early 2024 we are running a series of dialogue events and releasing a podcast to engage practitioners and the public to reflect on the findings in the three contexts explored.

Artist residency: We have partnered with the Watershed's Pervasive Media Studio to host an artist in residence, composer and improviser, Craig Scott, to respond to emerging themes across all case studies. The arts residency aims to engage public audiences with our research, and there will be a musical performance and sharing of his human-machine learning response in a hybrid format in February 2024. Find out more: <https://www.watershed.co.uk/studio/events/2024/02/09/lunchtime-talk-craig-against-machine>

Recent collaboration

Storytelling performance: Data/opium

In 2022, we collaborated with Otis Mensah, musician/writer and the first Poet Laureate of Sheffield, and ENON Films to produce a short storytelling performance in response to early findings of our pharma case study.

The film is available on our website:
<https://lifeofdata.org/site/patterns-in-practice/data-opium/>



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For more information about the project and our upcoming events, please visit:
<https://lifeofdata.org/site/patterns-in-practice/>

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