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THE EVOLUTION OF LEARNING ANALYTICS PRACTICE OVER SIX YEARS AT THE OPEN UNIVERSITY, UK; WHAT ARE THE ARRANGEMENTS THAT ENABLE OR CONSTRAIN THIS PRACTICE?

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Abstract

Learning analytics is a rapidly expanding area of interest for many higher education institutions. Over the last decade the focus in this field has largely been on the technical challenges associated with collecting, storing and refining data in order for it to be presented to users in actionable visualisations. Much of this work has been accompanied by an underlying assumption that once presented learning analytics will lead to improvements that are not yet clearly defined. However, the practice of educators in using learning analytics has not been well studied. This study has used the Theory of Practice Architectures as a methodology in order to describe the situated practice of learning analytics (what it means to 'do' learning analytics), and to explore the contextual arrangements that serve to enable or constrain that practice. Based on two sets of semi-structured interviews - separated by six years - of academics and academic-related staff from a large open and distance learning university the study provides insights into the evolution of learning analytics practice. The findings suggest that the establishment of reliable and trustworthy data, and its presentation, is only the first step in a long and ongoing process that requires serious and substantial ongoing support at the institutional level. To illustrate this, learning analytics is discussed in terms of the actions that it prompts, the language that characterizes practice, and the time and resources that are required to embed it into meaningful practice.

Keywords: Learning analytics, educational practice, theory of practice architectures, distance education.

1 INTRODUCTION

In the UK, and elsewhere, recent changes in the higher education policy environment have placed an increasing emphasis on evaluating and reporting university business through the medium of data and analytics. Most higher education institutions now also view the increased use of learning analytics as being central to realising improvements to student academic achievement, university retention outcomes, and learning & teaching practice [1]. We use the term learning analytics, and its acronym LA, in accordance with the widely accepted definition: 'Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs' [2]. Universities worldwide have launched, supported, and invested heavily in a range of LA projects which have commonly included initiatives such as the establishment of Cloud-based 'data warehouses' or 'data lakes'; the visualisation of complex data into 'LA dashboards'; the alignment of LA with learning design approaches; and the evolution of algorithm-based predictive learning analytics models.

These well reported implementations are often accompanied by a prevailing normative 'technological determinist' ideology in which it is accepted that the implementation of ever more technologically complex LA initiatives are unquestioned since they will naturally lead to the realisation of the 'potential' of LA and hence to the improvements outlined earlier [3]. However, to date, evidence on the impact of such LA implementations remains inconclusive and scant. A comprehensive review of 246 submissions to the Journal of Learning Analytics (JLA) and to the Learning Analytics & Knowledge Conference (LAK) found that 89% did not make any attempt to optimize or improve a learning environment [4]. Sometimes forgotten is that such LA initiatives also require human engagement and intervention to work but little work has been done to explore how and why educators incorporate LA into their teaching and learning practice or describe and explain the eco-systems and contexts in which such implementations take place. For example, a systematic literature review was unable to identify any studies that set out to evaluate the actions of teachers when given LA with sample sizes of over 10 in authentic University settings [5]. Similarly, a 2023 JLA editorial concluded with the view that future focus in LA research in

distance learning should be on how students, teachers and administrators make sense of learning analytics in their practice [6].

The Open University, UK (UKOU) is Europe's largest distance learning organisation and has been active in developing many different, but linked, LA implementation approaches to develop an 'analytics mind-set' that encourages and supports staff in evidence-based decision making throughout their routine work [7]. Between 2014 and 2018 the OU 'Analytics Project' developed three initiatives in parallel. In one, the technical constraints of accessing, cleaning, and extracting useful LA from the existing data warehouse needed to be overcome and the data visualised in a suite of dashboards. To support the use of these dashboards the Analytics4Action (A4A) Framework process was designed [8]. These initiatives were designed to support academics and academic-related staff engaged in distance learning and teaching in their interpretation of LA and to inform evidence-based actions. At the UKOU, staff such as these who are engaged with designing and administering the delivery of distance learning and teaching rather than research are typically allocated to specific pieces of learning called modules and are collectively referred to as 'module teams.' Day to day contact with students is typically the responsibility of another group of staff, referred to as tutors. Since 2018, the use of LA has slowly evolved with the intent of becoming 'business-as-usual'. Ongoing technical data work has been the responsibility of the centrally situated Data and Student Analytics (DSA) unit, whilst the faculties, supported by the A4A Framework and an evaluation strand within the Learning Design team, have continued to develop their own practice.

This study seeks to utilise the Theory of Practice Architectures (TPA) to investigate the evolution of LA practice in the Faculty of Science, Technology, Engineering & Mathematics (STEM) at the UKOU. TPA has been described as 'a basis for a contemporary theory of education appropriate for the modern world.' [9] and it has been widely applied as a tool for the analysis of such varied projects as Education for Sustainability [10], English language teaching [11], doctoral education [12], teacher education [13], leading in educational contexts [14], and learning design [15].

The findings are based on two sets of semi-structured interviews conducted in 2018 and 2023 with over 30 faculty staff engaged in applying a range of LA implementations to their learning and teaching practice. Using this longitudinal approach, the results provide insight into how LA practice has evolved over the last six years. The findings suggest that the establishment of reliable and trustworthy data, and its presentation, is only the first step in a long and ongoing process that requires serious and substantial ongoing support at the institutional level. In particular, the study found that LA practice was influenced by the language of LA and the time it took to put into meaningful practice. Therefore, this study can be seen as a step in identifying transferable recommendations for strategies and structures to support educators in the use of LA implementations in other higher education contexts - and move the field beyond merely demonstrating potential.

This study sought to address the following research questions:

RQ1: What does it mean to 'do' learning analytics in the Faculty of STEM at the UKOU?

RQ2: What are the arrangements that enable and/or constrain the practice of learning analytics in the Faculty of STEM at the UKOU?

2 METHODOLOGY

The Theory of Practice Architectures (TPA) is described as 'an account of what practices are composed of and how practices shape, and are shaped, by the arrangements in which they are enmeshed in a site of practice' [9]. As such, TPA takes a site-orientated, ontological approach to investigating practices. This theoretical lens can be used to develop a holistic view of practices such as distance learning, that are essentially social phenomena, and address questions from a personal and organizational point of view about what is being done, how it is being done, and why it is done in that way [16].

TPA calls for an exploration and identification of the arrangements that prefigure and shape such practices that exist across 3 mediums: *material-economic*, *cultural-discursive* & *social-political* [9]. In the practice of distance learning, *material-economic arrangements* are what make the activities of the

practice possible, and in the project of implementing LA, might include such things as the time available to engage or LA dashboards and spreadsheets. These arrangements constrain or enable the *doings* of the practice. *Cultural-discursive arrangements* refer to the specialist language or discourse that prefigure, constrain, or enable the *sayings* of a practice. Like any other projects within distance learning, LA has developed its own specific references and language that is used by practitioners to describe and justify what it is, and how it is practiced. This might include how dashboards are referred to, or the definitions of certain data sources. These *sayings* might be contained in documentation or might be live in discussion between those engaged in seeking meaning from LA. Thirdly, *social-political arrangements* shape and prefigure the *relatings* of a practice and are therefore concerned with how humans relate to one another, behave in the roles they are representing, exist in the power structures that the organization provides, and bring experience to group or team environments. For example, since LA dashboards are not usually built by the same people that are required to use them, and the responsibility for their use has not necessarily been clearly articulated, this interaction is very relevant.

In the project of LA, practitioners engage in a social phenomenon which contains specialist discourse (sayings), activities and work (doings), and engagement of module teams in a complex ecology of power structures and individuals (relatings). While these separate arrangements can be considered in isolation, in reality they are inter-related and prefigured, but not predetermined. They should therefore be viewed as being in a constant state of flux, constantly shaped and reshaped by the passing of time, events, and individuals in a dynamic relationship [13]. Indeed, analysis of how these arrangements come to *hang together* in the STEM Faculty of the UKOU site of practice, should allow for the analysis of how one impacts on another and the identification of new and progressive approaches. This is shown in figure 1 [9].

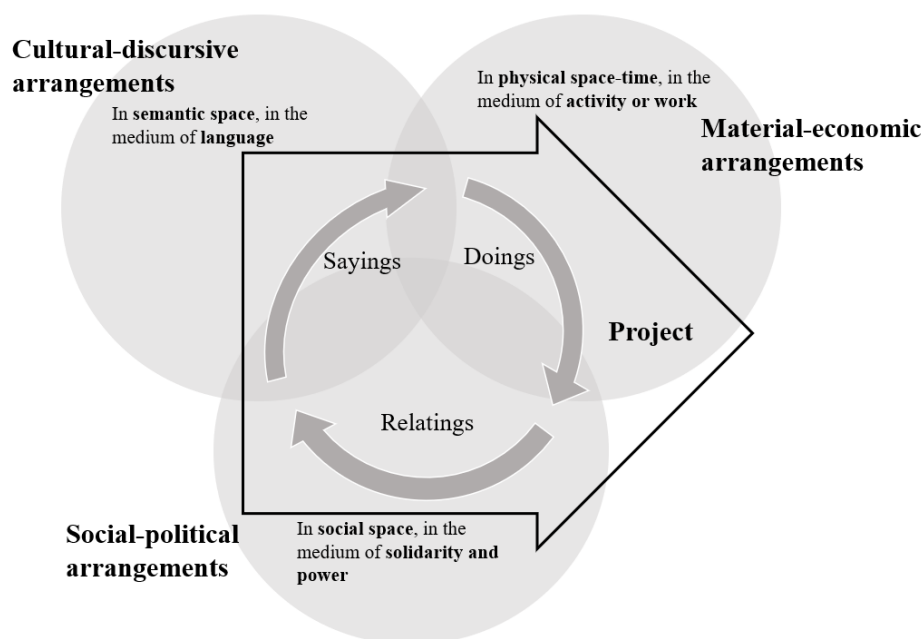


Figure 1: how arrangements *hang together* in TPA [9]

In 2017 the authors initiated a project supported by the Centre for Scholarship in STEM (eSTEEeM) which was prompted by the introduction of a new LA implementation into an existing suite of LA dashboards and the formalisation of the use of data and analytics as a priority in the STEM Retention and Progression Plan 2017/18. One strand of the project sought to investigate the use of the new LA implementation by tutors (for details see [17] [18]) whilst the strand of the project in question here sought to investigate the use of LA by 26 members of thirteen module teams over the course of the 2017/18 academic year with a particular focus on the use of the new LA implementation. All the module teams had had previous support from A4A. The project used a situated, social informatics approach to collect a wide range of evaluation data and undertake a series of reflective, semi-structured interviews designed to provide a detailed picture of LA practice that focused on context, mechanisms, and outcomes.

In 2023 the authors reviewed the collected data and re-interviewed as many of the academics and academic-related staff from the original set as possible using an instrument based on TPA. Where staff had left the institution, the current staff allocated to module teams were interviewed. In total, sixteen module team members were interviewed from nine module teams. During the six years between the projects multiple new sources of LA were now available to the teams. They were asked about their aims in using LA, their actual use, their perceptions of how their practice had changed since 2017/18, and the arrangements that constrained or enabled their practice. Where appropriate they were reminded of their previous interview responses and asked to comment.

In both cases the interviews were recorded using Skype or MS Teams and transcribed by administrative staff from within the STEM Faculty. Transcriptions were then anonymised and uploaded to NVivo analysis software. The first set of interviews were analysed using a form of Reflexive Thematic Analysis [19] to generate six themes. This report was published internally by eSTEEem along with other findings (see acknowledgements). The second set of interviews were combined with the first set and analysed using TPA.

3 RESULTS

RQ1: What does it mean to 'do' learning analytics in the Faculty of STEM at the UKOU?

In 2017/18 nine of the thirteen module teams identified improved student retention, progression, pass and/or completion rates as one of their desired outcomes of using LA. None of these nine teams considered this outcome to have been realized. In general, the module teams found it difficult in their experience to associate the use of LA with student outcomes in amongst a range of different retention initiatives. As one academic commented, '...there's so many different interventions going on, you're practically tripping over!'. Piloting module teams did not generally perceive the use of LA as being responsible for any improvements to retention or student outcomes.

In 2022/23 the improvement of retention continued to be the primary aim of module teams in engaging with LA. The module teams that were interviewed were asked to provide examples of their LA practice in terms of *doings*, *sayings* and *relatings* and twelve examples were collected. In terms of *doings*, the types of data that were accessed were broad. Eight of the examples referenced accessing LA for information on assessment, five for student numbers (retention/at risk/registrations), two for study intensity/pathways, two about learning design, and one on plagiarism. Eight of the twelve examples demonstrated the articulation of a clear action based on the use of LA which were split between student support (five references), learning design (two references), and no deliberate action (one reference). Four examples were unclear about identifying any action based on LA. In terms of *relatings*, seven of the twelve examples referenced collection/sourcing data as an individual activity, whilst nine referenced LA being used to prompt/share/inform discussions with wider members of the module team and/or faculty colleagues. The *sayings* used to describe the experience of using LA were both positive and negative. Negative experiences were described as: frustrating (four references), painful, clunky, unclear in relations to systems, lack of time available (three references), and unreliable or non-timely data. Positive experiences were described using the words: confidence (two references) enjoy (two references), excited, useful, grateful, reassuring, rewarding, timely, immediate, brilliant.

The idea that LA was a 'game-changer', i.e., that it would fundamentally change their learning & teaching practice, was not expressed by any of the module teams in the 2017/18 interviews. Whilst there were positive comments focused on identifying the available LA as 'useful' and as having 'potential', interviewees were generally unable to specify actions they intended to take based on it. In 2022/23 the module teams were asked specifically about this question and eleven provided a response. Seven of these did not view LA as a 'game-changer', preferring to conclude that any current attributable impact was either too small to warrant that description, or that LA use was still offering only potential, or had only improved confidence and understanding. One suggested that it might be a game-changer for others (but not them), another thought current LA was not actionable enough, or that it just took up too much time. However, four other responses were much more confident, pointing to experiences in other educational settings as evidence, as well as the importance of LA enabling direct action. One interviewee framed their thoughts as a question: 'What do you have without it [LA]? You have gut reaction, and you have intuition, and you have a feeling about how it goes. How can you argue the case [for an intervention] when this is all that you've got to argue it on?'.

RQ2: What are the arrangements that enable and/or constrain the practice of learning analytics in the Faculty of STEM at the UKOU?

In terms of *material-economic arrangements* the increase in the amount and quality of new LA dashboards produced by DSA was described as being an enabler of practice by at least eleven of the respondents who made comments such as, 'I'm really glad it exists. I'm really glad we have it. I think it's amazing...' and 'I'd be really upset if they took my data away'. However, themes from the 2017/18 interviews that continued to be considered constraints on practice were about trust in the LA, applicability of the LA to the specific module context in order to act, and the efficient identification and navigation of so many complex data sources. Comments included, '...you just almost can't see the wood for the trees' and '...surely the biggest barrier is that there's nothing all in one place'.

Whilst these constraints were very much evident in the interviews, the most common and consistent constraint was around the lack of time available to module team members to spend developing and exploring their LA practice. It is evident from these comments that the module team members that were interviewed did not perceive the use of LA in the site of practice investigated here as an easy or straightforward task where the work had mostly been done for them by the designers of the LA dashboards. Rather that it took a substantial commitment from them in terms of time and activity which may have been better spent, in the opinions of some at least, '...trying to forge good relationships with my students rather than looking at who has clicked on the web page this week'. For these reasons, the interviews demonstrated a powerlessness to respond to the demands of keeping up to date with LA developments and a forced reliance on the LA tools or sources they were most familiar with.

Analysis of the *cultural-discursive arrangements* revealed some interesting findings about the language that was used around LA and how it could be seen as both an enabler and constraint on practice. For example, one respondent shared an anecdote about how they had changed the language they used when they had discovered a set of predictive data supported what they already perceived based on their experience, about a set of students likely to struggle in the next intake on a particular module. Rather than share the information with colleagues using data terms (loaded as that was likely to be with language such as 'algorithms' and 'machine learning'), the staff member preferred to present the information relying on their experience as evidence and believed that was more effective. Conversely, three interviews referenced examples of knowledge gained from the use of LA dashboards being used to debunk 'myths' which had become widely accepted in colleagues thinking about student behaviour. Referring to LA dashboards, tools and sources by the incorrect names was also persistent. On the whole, the interviewees tended to refer to specific LA sources by either the department of the University that had developed them, the model that underpinned the data, the person that had first demonstrated it to them, or the generic platform/software which hosted the information. Opinion was divided amongst the interviewees about the extent to which this was a problem or not, but repeated clarification and the presence of visual cues were required during the interviews to ensure that all parties were referring to the same things. Nevertheless, confusion was present.

4 CONCLUSIONS

Due to the constraints of space and time the evidence presented here can only ever be a snapshot of the volume of qualitative data that was generated. We have attempted to illustrate the key findings as best as possible, but we have not, for example, discussed the *social-political arrangements* (which were considered to require too much UKOU-specific knowledge for an external audience to get value from despite being of importance). We have only touched on some of themes identified in the 2017/18 work, and not mentioned ethics or students at all. The study has also only been able to capture information from a small group of module team members who may not necessarily be representative of the module team cohort in the Faculty of STEM as a whole. We made every effort to ensure that this was not the case but extrapolating findings like this is always problematic. Using TPA as a methodological framework to structure the interview instrument and organise the findings has allowed us to mitigate these limitations and share our findings in a way which could be compared with other studies that adopt this methodology [14]. Further, TPA has allowed us to respond to calls for greater emphasis on research on LA practice rather than LA techniques [4], and can be viewed as part of a growing body of educational technology research that is increasingly taking a more socio-technological approach [20] [21].

Whilst being aware of these limitations, the initial findings from this study suggest that there has been only a very limited or gradual evolution in the development of LA practice in the Faculty of STEM at the UKOU over the last six years. This is evidenced by an increased ability of the interviewees to identify actions they have taken based on their use of LA, and their acceptance that there is far more data now

available to them that is perceived as 'useful' or 'helpful'. One area that could be explored further is the idea of LA as a 'myth buster', that is, LA as a way to prevent myths pervading and influencing poorly thought through interventions. By extension, the capturing of instances where LA has led to an evidence-based 'no action' being taken may reveal applications of LA that have previously been 'hidden' to researchers [18].

Despite this, it seems reasonable to question whether this small evolution has been worth it. The UKOU is not alone in the sector in providing substantial investment in time and resources to the technical questions of LA with little evidence of actual impact [22] and in STEM there is no doubt that attitudes towards the use of LA remained mixed and inconclusive [18]. For a few of our interviewees the use of LA was embedded into their work (even if the tangible outputs were not entirely clear) and they were able to articulate that. However, more commonly (and we include here several module team members who did not agree to be interviewed because they felt their lack of LA practice would not be of interest to us) expressed the feelings of a group who were somewhat overwhelmed by LA and still did not know exactly which LA to use, or when or how they were supposed to be using it in their practice. Support mechanisms such as A4A, when mentioned, were valued due to the fact that they ringfenced time and provided expertise to draw on from those more familiar with LA. The evidence found here strongly suggests that an expansion of this kind of support is needed and would be welcome. We therefore agree with recent mainstream developments in the sector that call for more focus on practice and less on technical questions [22]. A thorny question that remains for higher education is whether the small gains evidenced here represent a realisation of the 'potential' for LA that drove initial projects and activity [7], or do they point instead to a drain on academic time and resources that may have been spent more fruitfully elsewhere?

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