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Conference Paper · December 2016

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Data, the Story, the Storyteller

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Abstract: This short position paper is focused on questions that arise from the entire data lifecycle, from data specification and gathering, to visualisation and interpretation, to data storytelling. We argue that storytelling and human sense-making are critical considerations in how we might determine the validity of learning analytics and highlight data literacy as a critical competency in the emerging era where data has increasing value. We use data collected by the Government of India to illustrate our argument in which two issues arise: lack of protocols and adequate structure supporting learning analytics methods based on sound educational research.

Keywords: data, data literacy, data visualisation, data storytelling, learning analytics

1. Introduction

Schools and universities around the world collect student data routinely. Making use of such data, however, can be a challenging task for teachers and educators – it is not always straightforward how to use the collected information effectively in order to optimise student learning outcomes. Moreover, higher education "has traditionally been inefficient in its data use, often operating with substantial delays in analysing readily evident data and feedback" (Siemens & Long, 2011, p. 32).

Educational technologies are fast converging to fill this gap through the new field of Learning Analytics. Using big data to predict behaviour and through tracking learning activities of students who may come from different backgrounds, places and differing abilities aims to address this need while offering new insights that extend teaching and learning, exploring frontiers not previously accessible. The ongoing revolution instigated by innovation in digital technology continues to excite and enable new practices in education; it is ushering in, however, a new world of challenges associated with data.

2. Position

We situate our position on learning analytics within a broader context that connects with the discourse on *21st century skills* and competencies. In particular, we are concerned with determining the scope of what *data literacy* is or might need to be. With the rapid development and deployment of analytics tools in recent years, in which data visualisation occupies a prominent place, we find that:

- As a term, data *is* as much as data *are* – and academic pedantry will not change that;
- Data is not (necessarily) neutral;
- Data can be misused and misunderstood;
- Cultural and ethical dimensions need to be considered as aspects of data literacy;
- The emerging era of *data-driven everything* presents new challenges for human sense-making;
- The (data) story and the storyteller are contextually bound and should not be separated; and,
- Asking key questions of the data is an art and science.

3. Data Literacy

For us, data literacy implies capabilities of gathering, processing, analysing and presenting data as information to support decision making. But what is data, how is it created, and how do we need to retrieve and interpret information from it? We are often 'data rich and information poor' within an expanding data environment of spreadsheets, reports, books, surveys, Facebook likes, pictures, twitter streams, newspapers, 24-hour TV news cycles and numerous other sources all aiming to inform us

with data. How can we know whether our learning is rightly directed, ethical or even correct? Is there something in the data or excluded from it that the storyteller hasn't told? How can we become data literate and develop skills that assist in asking key questions? How do we devise ways to make sense of data that can inform how we might improve our practices? The discourse on *21st century skills* opens one pathway, although such an umbrella term is itself problematic. Responding effectively will likely require new tools, expertise, dogged curiosity as well as willingness to act on what we find. Challenges of cognitive bias and whether data visualizations might be conveying emotional content are just a few.

In determining the scope of data literacy Gummer and Mandinach (2015) propose a useful framework that considers data functions during teaching and learning giving emphasis to the inquiry cycle. Elsewhere, we support this approach but raise further questions about the semantics and scope of literacy and numeracy in the emerging age of data-driven everything (Mason, Khan, & Smith, 2016).

4. Indian Case-Studies

In reporting 2011 census data on religion, Indian newspapers used the same data with different headlines and stories: e.g., in *The Times of India*, "Hindu population declined, Muslims increased"; while for *The Hindu*, "Muslim population growth slows". Such difference is striking but is actually commonplace – if we look for it. As educators, what do we make of such reporting? We suggest that *data literacy* needs to imply access to validation tools that relate to data as well as the storyteller.

In a 2013-2014 survey implemented by the Government of India analysis of results estimated that the total enrolment in higher education was 32.3 million of which around 17.5 million (54 %) were boys and 14.8 million (46%) were girls. Distance enrolments represented 11.7 % of total enrolment (Government of India, 2015). The shear enormity of this young population seeking formal education makes a compelling argument for utilising learning analytics to shape and improve the delivery of formal education. In 2015 some Indian venture capital firms assessing the potential and business model raised $40m to fund educational technologies while others placed funds elsewhere because they see the sector as 'too hyped' (Yourstory, 2015). Simple arithmetic tells us that if costs are as low as $1 per month per student this would equate to approximately a $400 million/year market. Perhaps it is caution playing out that deployment of learning analytics is not yet being scaled up. Perhaps this is wise.

Due to the lack of mature protocols and established processes questions that need to be addressed prior to implementing learning analytics include topics such as privacy, safety, assessment, management, ethical use, and determining what data can legitimately be collected (from both structured and unstructured sources) to avoid misuse and misinterpretation. In reviewing available documentation, we find that these issues are not yet sufficiently addressed if the full scope of data literacy is considered.

5. Conclusion

As data determines more and more what we do it is imperative that the digital technologies being used to render data into information as well as knowledge and information into data are designed in ways that enable us to check the veracity of the data, the story and the storyteller. What we don't want is indiscriminate rendering of raw data into compelling visualizations and even actionable knowledge for teachers and learners to manipulate without any validation let alone informed consent.

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