2nd CrossMMLA: Multimodal Learning Analytics Across Physical and Digital Spaces

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ABSTRACT: Students' learning is ubiquitous. It happens wherever the learner is rather than being constrained to a specific physical or digital learning space (e.g. the classroom or the institutional LMS respectively). A critical question is: how to integrate and coordinate learning analytics to provide continued support to learning across physical and digital spaces? CrossMMLA is the successor to the Learning Analytics Across Spaces (CrossLAK) and MultiModal Learning Analytics (MMLA) series of workshops that were merged in 2017 after successful cross-pollination between the two communities. Although it may be said that

CrossLAK and MMLA perspectives follow different philosophical and practical approaches, they both share a common aim. This aim is: deploying learning analytics innovations that can be used across diverse authentic learning environments whilst learners feature various modalities of interaction or behaviour.

Keywords: Learning analytics, seamless learning, integration, multimodal

1 WORKSHOP BACKGROUND

1.1 Motivation

Educational research has revealed the pedagogical benefits of letting students experience different types of content, "real world" challenges, and physical and social interactions with educators or other learners (Delgado Kloos, Hernández-Leo, & Asensio-Pérez, 2012). This is partly because student's learning happens in situ, where the learner is (Sharples, M., & Roschelle, 2010). Learning is not necessarily constrained to a specific physical space (e.g. the classroom) or a digital environment (e.g. an institutional learning management system or a specific learning digital tool). Moreover, in practice, students commonly work outside the boundaries of the institutional learning system(s). This inherently blended nature of learning settings makes it essential to move beyond learning analytics that rely solely on a single data source (e.g. log files) or that focus only on the interactions that occur between learners and a specific system without considering the context of use. A critical question is: how to integrate and coordinate learning analytics to provide continued support to learning across physical and digital spaces?

CrossMMLA is the successor to the Learning Analytics Across Spaces (CrossLAK) and MultiModal Learning Analytics (MMLA) series of workshops that were merged in 2017 after successful cross-pollination and synergetic efforts between the two communities. CrossLAK and MMLA perspectives follow different philosophical and practical approaches. It may be said that CrossLAK follows a top-down approach, focusing on learning first and then on the analytics. First, it embraces the complexity of learning as an activity which is distributed across spaces, people, tools (both digital and physical) and time. Once the "learning problem" has been identified, a CrossLAK initiative would analyse the feasibility of using learning analytics to tackle such a problem. These analytics may be very simple (unimodal) or quite sophisticated (multimodal). Since the focus is on learning happening in authentic spaces, the philosophical intention is to apply analytics in-the-wild rather than in-the-lab.

By contrast, we can say that MMLA favours a bottom-up approach where the focus is on the analytics grounded by learning theory and practice. MMLA can provide insights into learning processes that happen across multiple contexts between people, devices and resources (both physical and digital), which often are hard to model and orchestrate (Scherer, Worsley & Morency, 2012; Worsley et al., 2015; Prieto et al., 2016; Ochoa et al. 2017). MMLA leverages the increasingly widespread availability of sensors and high-frequency data collection technologies to enrich the

existing data available. Using such technologies, in combination with machine learning and artificial intelligence techniques, a number of solutions can be offered to ubiquitous learning. Although, several MMLA projects have been conducted in-the-lab (see review in Ochoa, 2017), the intention of this joint workshop is for MMLA to also move into-the-wild.

Although CrossLAK and MMLA have some elements that distinguish them from each other, they both share the common aim of deploying learning analytics innovations that can be used across diverse authentic learning environments whilst learners feature various modalities of interaction or behaviour. LA researchers can now perform text, speech, handwriting, sketch, gesture, affective, neurophysical, or eye gaze analyses (Donnelly et al. 2016; Prieto et al., 2016). Collecting and understanding data from the everyday learning environments becomes increasingly challenging. However, pervasive and mobile technologies can be used to allow learners to get remote access to educational resources from different physical spaces (e.g. ubiquitous/mobile learning support) or to enrich their learning experiences in the classroom in ways that were not previously possible (e.g. face-to-face/blended learning support). This is creating new possibilities for learning analytics to provide continued support or a more holistic view of learning, moving beyond desktop-based learning resources.

Our aim as a joint CrossMMLA community is to make learning analytics relevant across, physical, digital, and blended learning environments while making the tools more accessible to the wider community. Therefore, researchers and practitioners need to address the larger frame of what is happening across the digital and physical space and between individuals, groups, and the entire class while balancing the data, collection, analysis and visualisation.

2 PROGRAM

One of the key aims of the workshop is to attract researchers (from diverse communities) to consider how multimodal learning analytics can be used across diverse learning environments. The intention is to gather interested parties in ubiquitous, mobile and/or face-to-face learning analytics with a focus on multimodal interaction. For this call for contributions, six papers were accepted, tackling present and future challenges, and considerations for the community, from conceptual to technical approaches.

Three activities have been planned for this full-day workshop: the first activity will be a **panel discussion** focused on intermediate constructs/indicators in CrossMMLA (a recurring topic that emerged in the last workshops). The second activity will be a **hands-on ideation task** focused on identifying critical systems, tools, standards in MMLA (e.g., towards a unified CrossMMLA stack). Finally, the third activity will be a **practical/hands-on MMLA training** using multimodal sensors (e.g. multimodal selfies, beacons, etc.) and tools to then explore/analyse the data. Authors' papers will be presented as posters, with a poster madness session at the beginning of the day with some discussion around the posters during the breaks.

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