LEARNING ANALYTICS: PERSPECTIVES FROM MAINLAND CHINA

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1. Introduction

Since the emergence of learning analytics as a scholarly field, it has been garnering significant interest among educational researchers in Mainland China (hereafter referred to as China). A search of the *China Academic Journals Full-text Database* shows that the term "learning analytics" entered Chinese scholarly discourse in 2012 with the publication of seven articles. By 2016, the number of published articles on learning analytics had grown to 88. Yet this increase only reflects a glimpse of growing interest in this area, motivated by emerging national big data agendas across all sectors of China. Since 2012, a dozen policy documents emphasizing "big data" have been published by the Chinese Central Government, covering important strategic areas including medicine, energy, manufacturing, and education.[1] In this brief paper, we discuss the nascent development of learning analytics in China in response to three cornerstones of education – quality, equity, and efficiency – highlighted in Gašević (2018). In the following sections, we situate our discussion in the Chinese context, highlight key opportunities, and discuss foreseeable barriers and coping strategies for implementing learning analytics in China.

2. Understanding the Chinese Context

In an analysis of educational reform in China, Zhou and Zhu (2007) identified four major challenges that remain applicable today, namely, the demand for relevant curricula in rural areas; the lack of diversified learning resources; the need for long-term teacher professional development; and prevalent examination-driven educational practices. Underpinning these challenges are complex historical, political, social, and cultural realities in China including nationwide unbalanced development, centralized educational administration, and staggering progress in technology integration in education. While these challenges and realities offer opportunities for learning analytics to make a difference, they also bound the development of learning analytics in the Chinese context and therefore need to be recognized in discussions of learning analytics' potential impact on the quality, equity, and efficiency of China's education systems.

2.1. A rising country with unbalanced development

Over the past four decades of Chinese economic reform, China has achieved remarkable economic

[1] See, for example, the State Council's Announcement Regarding the Program of Action for Big Data Development: http://www.gov.cn/zhengce/content/2015-09/05/%20content_10137.htm.
[2] https://www.chinainternetwatch.com/whitepaper/china-internet-statistics/#ixzz4jBqrQc9s

progress. In the technology sector, China's Internet users reached 731 million and an Internet penetration rate of 53.2% in late 2016; 95.1% of users could access the Internet through mobile devices. In education, the Nine-Year Compulsory Education Law has dramatically elevated China's literacy rate from 68% in 1980 to 94.3% in 2010 (Malik, 2013) while China's more recent expansion of higher education is driving college education mainstream (Zha, 2012). Overall, public education in China has greatly improved in terms of both access and quality over the past few decades.

However, incredible imbalance figures in China's economic, cultural, and educational development (Jahan, 2015). According to the National Bureau of Statistics of China, while its national average GDP per capita reached RMB 43,852 ($7,248) in 2013,[3] the highest GDP per capita among all metropolitan areas was 25 times more than the lowest; in terms of educational expenditure per student, Hebei Province spent the lowest at RMB 1,404 ($232) in comparison to RMB 4,727 ($782) by neighboring Beijing. On the one hand, regions with tremendous growth are demanding high-quality education – public or private, formal or informal, face-to-face or online – that is comparable to the Global North. On the other hand, many underdeveloped regions are still lacking necessary resources to attract qualified teachers, maintain relevant learning resources, and gain access to modern technologies. So far, various regional, national, and transnational efforts have been made to mitigate these imbalances between urban and rural areas, and between eastern and western provinces. Examples include the national *Western Development Campaign* (Goodman, 2004), the *Distance Education Program for Rural Areas* (Wang & Feng, 2012), and initiatives funded by international aid agencies, nonprofits, and transnational corporations (e.g., Robinson, 2016; Robinson & Yi, 2009; Wu & Li, 2003). New educational reforms in China need to operate within constraints set by the imbalance and inequity (Zhou & Zhu, 2007), and seek congruence with existing initiatives.

2.2. The top-down administration mode

In China, the government has tremendous power in shaping innovation in all sectors including education. For instance, the governance structure in Chinese universities, which pivots on the party secretary, gives little decision-making power to faculty members, in contrast to the faculty governance model in the Global North. In basic education, local administrative departments of education, instead of individual schools, dictate a range of activities such as resource allocation, exam administration, teacher professional development, and so on. Decentralization of these activities in schools, while not nonexistent, is rare especially in underdeveloped regions. Local administrations are more responsive to policies from the "top" or higher-level offices than to local schools. One example is that any change with the College Entrance Exam (the *Gaokao*) – which largely determines what is taught in classrooms – would spur intensive reactions from local administrations and schools (Rui, 2014).[4] This top-down administration mode is influencing how stakeholders in education, e.g., teachers and parents, respond to innovations. If a learning analytics innovation introduced from the "outside" is not considered consonant with current agendas from the top, it is less likely to be embraced by stakeholders. In contrast to this, if an innovation is channeled through the top and is shown to contribute to existing agendas, not only will it have a better chance of being adopted, it will also likely be implemented efficiently and at scale. This reality bounds the implementation of educational innovations, including learning analytics, and needs to be considered in any attempts to sustain changes.

[3] See National Bureau of Statistics of China http://data.stats.gov.cn/easyquery.htm?cn=C01. The used exchange rate in 2013 was RMB ¥ 6.05 = US$1.00.

[4] See, for example, the latest attempt to adjust the weights of different subject areas in the 2017 College Entrance Exam: https://internationaleducation.gov.au/News/Latest-News/Pages/Gaokao.aspx

2.3. Technology integration: A work in progress

Technology integration in China's education systems provides an important context for the development of learning analytics. In its *National Mid- to Long-term Educational Reform and Development Plan* (*2010-2020*), technology integration is emphasized as a transformative force in educational reforms. In the past few decades, China has invested heavily in educational resources and ICT infrastructures, leading to substantial progress in technology integration in education at all levels. In light of the UNESCO model of ICT development in education (Zhou, Shinohara, & Lee, 2005), China is moving from the initial "emerging" and "applying" stages towards more advanced stages of "infusing" and "transforming" (Zhu, 2012). However, tensions exist in various aspects of planning, management, execution, and implementation of technology integration that have led to redundant, incoherent efforts and unclear governance in earlier initiatives (Yu, 2012). Technology integration in China has historically focused on the technology side and largely remains a work-in-progress in both developing and developed regions of the country. Development in learning analytics needs to build on and learn from prior and ongoing efforts in technology integration.

3. Opportunities for Learning Analytics

With these contextual factors in mind, we discuss below opportunities offered by learning analytics to address quality, equity, and efficiency issues in education highlighted in Gašević (2018).

3.1. Assessment regimes, learner agency, and 21st century competencies

Learning analytics has the potential to challenge exam-driven educational practices prevalent in China's K-12 education (Zhou & Zhu, 2007). Despite the high performance of Chinese educational regimes in international standardized tests such as the Programme for International Student Assessment (PISA) (Sellar & Lingard, 2013), China's exam-driven practices are facing intense criticism (Zhao, 2012). Chinese curriculum standards have also been criticized for a lack of emphasis on 21st century competencies and student agency in learning. The development of learning analytics in China is destined to be influenced by its current assessment regimes centering on high-stakes formal exams and rote learning (Knight, Buckingham Shum, & Littleton, 2014).

In this situation, learning analytics can be a tool for reforming educational assessment – to defy the traditional reliance on examinations and advocate for a fuller picture of learning. Indeed, exams as a form of summative assessment are narrow in scope and insufficient in capturing learning processes. In the face of demands for high-quality education, especially from China's increasingly well-educated families, the traditional test-and-drill practice falls short in meeting emerging needs for more authentic and holistic learning experiences. Richer data and conscientious use of learning analytics offer a new opportunity for assessments to become more formative, integrated, holistic, and personalized (Gašević, 2018; Pea, 2014).

With informal education on the rise in China, particularly in areas such as educational games, new media, and environmental education, learning analytics could help unveil emerging genres of learning in non-traditional spaces. For example, given the environmental problems facing the country, some parents are seeking learning opportunities for their children that are more participatory and engaged in environmental issues. Novel data collection and analytics design, in combination with the pervasive use of social media in China, could make such learning designs and settings more visible and thus raise awareness of alternatives to exam-driven learning experiences.

Finally, learning analytics provides researchers, practitioners, and stakeholders an opportunity to engage with learner agency – absent in current exam-driven practices – as a genuine concern in education (Buckingham Shum, 2015). When educators are exposed to fresh views of learning they are not used to – such as learners being capable of deciding for themselves with support from analytics (e.g., Chen & Zhang, 2016) – confidence in transforming the assessment regime in China could be instilled.

3.2. Learning at scale

The scale of China's education system is massive, raising challenges but also providing opportunities for learning analytics. The challenge of being large-scale manifests at different levels. First of all, large class sizes are common in classrooms at all levels in China. In many primary and secondary schools, the class size is usually between 40 and 70 students despite mandates to reduce class sizes; in college, large lectures are typical. Providing personalized feedback to learners in these settings remains a challenge. As Gašević (2018) highlights, learning analytics offers means to provide personalized feedback to learners at scale where student-teacher ratios are high. Examples of successful efforts in the West include E²Coach at the University of Michigan (McKay, Miller, & Tritz, 2012) and the Summit Public Schools that originated from California (Childress & Benson, 2014).

Given China's large population, there are ample opportunities for learning analytics to support learning at scale beyond individual classrooms. As a matter of fact, startups powered by learning analytics have emerged to offer learning solutions at scale. For example, Pigai (meaning the Marking Website)[5] offers formative feedback on English essays based on writing analytics (Yang & Dai, 2015). By 2017, Pigai had scored more than 300 million essays for almost 18 million teachers and students in China. Other startup companies relying on certain forms of learning analytics also include Mita (an intelligent teaching assistant with predictive analytics) and Yuantiku (an item bank with test-and-drill services).[6] But aside from these efforts directly related to learning analytics, there are many other companies providing online learning solutions at scale that are yet to harness learning analytics for personalized learning. Such companies include New Oriental Online (run by a Nasdaq company specializing in English training), 100 Education (an online tutoring service from technology giant Xiaomi), and various massive open online course (MOOC) platforms backed by major technology companies in China. The integration of learning analytics into these solutions, if well designed, could contribute to quality learning at scale.

Nevertheless, it needs to be noted that these initiatives and opportunities are substantially influenced by the exam-driven culture discussed earlier and are in some cases reinforcing existing paradigms. Using learning analytics to make transformative changes, as advocated by Gašević (2018), requires systematic and coordinated efforts among stakeholders.

3.3. Teacher professional development

The synergy between learning analytics and teacher inquiry, which has been explored in international settings (Mor, Ferguson, & Wasson, 2015), could be explored in China especially in its developed regions. In recent years, renowned universities have launched teaching centers to support the professional development of their teaching faculties. By integrating learning analytics into their current offerings, teachers at these universities could become better poised to inquire into their own teaching. Such work is conducive to the development of new literacies among teachers, such as assessment and data literacies (Bocala & Boudett, 2015; Fullan, 2000)

[5] http://www.pigai.org/
[6] Mita: http://mita.mycos.com/. Yuantiku: https://yuantiku.com/.

and cultural and global competencies (Zhao, 2010), if teachers are exposed to analytics addressing diverse student populations.

In contrast to universities in developed regions of the country, schools in underdeveloped areas are facing a shortage of qualified teachers (Liu, 2014). There has been a significant teacher education gap in Western provinces, which has attracted national and international investments (Crichton & Kopp, 2006). Teachers in these regions lack access to quality professional learning opportunities; if any opportunities are available to them at all, these are often "one-shot workshops" delivered by experts that often fail to inspire or sustain real-world changes in their practices (Wu, Qin, & Zhang, 2009). The role learning analytics could play here, together with other emerging approaches such as MOOCs catered to in-service teachers (e.g., Wang, Chen, Fan, & Zhang, 2017), is to facilitate teacher professional distance learning. Providing teachers with access to learning analytics in these MOOCs could potentially help them regulate their professional learning, a skill which they can in turn nurture in their students (Randi, 2004). In addition, devising learning analytics to help teachers stay connected in communities of practice, either organized by third-parties (e.g., the *Intel Teach to the Future* community) or self-organized on social media, could potentially make a lasting impact on teacher professional learning on a large scale.

4. Ethical Use of Educational Data: Challenges and Opportunities

Ethics and privacy protection are vital for the success of learning analytics applications. The ongoing dialogue and debate over ethical use of educational data has led to evolving understandings that represent the values and perspectives of a wide range of stakeholders (Boyd & Crawford, 2012; Ifenthaler & Schumacher, 2016; Willis, Slade, & Prinsloo, 2016).

The development of learning analytics in China is expected to face considerable challenges in this area. First of all, ethical review boards are rare, if not nonexistent, in Chinese institutions, a drastically different situation than many countries in the Global North. Existing ethics review bodies in China are focused on medical research; they reside in governmental agencies, hospitals, and universities with medical schools (Guan & Fan, 2007) and have yet to attend to social sciences research involving human subjects. Protection of human subjects in educational research relies on the researcher's own morality and self-checking. Intensive participation of the corporate world in learning analytics could make this situation even more complex, raising important challenges for ethics and privacy protection in learning analytics.

To mitigate the situation, professional societies need to play a role. For example, the Chinese Association of Educational Technology, a professional association established in 1991, has served as a platform for discussing and recommending policies, regulations, and capacity building strategies.[7] Its broad reach within China, in K-16 and the industry, and its outward-looking posture (i.e., towards international counterparts such as the Association for Educational Communications and Technology) makes it an important player in the formulation of ethics guidelines in learning analytics. If awareness of ethics concerns could be raised broadly among researchers and practitioners, similar to what happened in medical science years ago (Guan & Fan, 2007), fast-tracking the development of ethics review mechanisms in China would be possible.

5. Concluding Remarks: The Need for Novel Models in the Chinese Context

Many discussions of learning analytics, this paper included, could seem to be merely wishful thinking. To move towards real-world changes in China, consideration needs to be given to its authentic

[7] See http://www.caet.org.cn/page/regulations

contexts – local, regional, and national. As Fullan (2000) observes, "the main enemies of large-scale reform are overload and extreme fragmentation" (p. 8); sustained reforms depend on the reciprocity between "inside" (the school) and "outside" (external forces, policy infrastructures). (See also Cuban, 1990.)

The development of learning analytics in emerging economies needs to avoid these enemies and look for connectedness within local systems and across levels of a system. Investments in external policies, internal cultures of schools, capacity building at multiple levels, and ongoing support need to go hand in hand to sustain impacts of educational reforms (Fullan, 2000).

Given the Chinese context, we need to look for novel models of learning analytics implementation (Wise & Vytasek, 2017) that are responsive to those aforementioned conditions and also "defiant" enough to challenge the status quo. Given the education reform agendas in China to cultivate an innovation-driven society, learning analytics could and *should* be used to find novel ways to promote 21st century competencies, learner agency, and entrepreneurship (Zhao, Meyer, Meyer, & Benavot, 2013) and in so doing, challenge the current exam-driven culture.

Because of the uniqueness of the Chinese context, we cannot transplant a model of learning analytics implementation that works in a Global North setting to China and expect it to work naturally. As Selwyn (2013) asserts, educational technology solutions are packed with a variety of interests, values, agendas, and ideological viewpoints. Importing a "Silicon Valley narrative" into American schools (e.g., Facebook's Summit schools) could face hurdles; needless to say, packaging a learning analytics solution developed by a Silicon Valley startup to profit from Chinese schools is destined to fail. When devising learning analytics initiatives in China, important questions need to be asked: How can the protection of student privacy be ensured? How can the competencies of teachers who are used to exam-driven teaching practices be developed? How can the "top-down" administration model be leveraged to nurture decentralization for local schools to explore learning analytics innovations? For learning analytics efforts in China, there may be fewer lessons to learn from the Global North in this regard. Chinese scholars and practitioners need to build on prior work by colleagues from other countries and develop novel models for their own contexts, which could, in turn, become important contributions to the international field of learning analytics.

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