

Scoping Technological Innovations in Education in Asia: Final Technical Report

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Project Objectives

The overall objective of the project was to develop a full proposal to build a research network on new digital learning modes and practices in Asia and Africa. The specific objectives of the project were:

1. to identify and prioritize key development problems that new digital learning modes and practices can address;
2. to identify key trends and best practices in new digital learning in Asia and Africa;
3. to formulate a detailed research agenda on new digital learning for Asia and Africa;
4. to specify the activities, expected outputs, indicators, schedules, key personnel, and funding requirements in support of the research agenda, including specifications for awarding and administering research grants; providing research project teams technical assistance; and disseminating research findings; and
5. to produce a full research proposal for funding consideration as a consolidated outcome of the first four objectives.

At the start of project implementation in May 2015, the Recipient and the Centre Contact, Mr. Matthew Smith, agreed to delimit the scope of the work to Asia. In October 2015, the Recipient was granted a one-month extension of the project to undertake inception and preparatory activities for the proposed research network called Digital Learning for Development (DL4D).

Project Activities and Accomplishments

A. Scoping of digital learning modes and practices in Asia

Scoping work on new digital learning modes and practices in Asia was conducted by the Recipient from June to July 2015 in two phases. The first phase of scoping work included 1) a desk review of literature on education systems in Asia, the status of technology in education in the region, and key trends and best practices in new digital learning, and 2) key informant interviews with academics and practitioners with knowledge of both project implementations and research being done in Asia.

The first phase of scoping surfaced three priority educational issues -- equity, quality and efficiency -- and four digital learning modes and practices of particular interest -- massive open online courses (MOOCs), intelligent tutoring systems (ITS), digital game-based learning (DGBL) and learning analytics (LA).

The second phase of scoping involved a review of research trends and gaps in MOOCs, ITS, DGBL and LA particularly in Asian developing countries.

The results of this review are summarized below.

1. The MOOC market is currently dominated by three US-based providers affiliated with top US universities: Coursera, Udacity and EdX. All three have established significant presence all over the world including Asia. However, homegrown Asian MOOCs are also on the rise in countries such as China, India, Malaysia and the Philippines (Xiang, 2015; Chen, 2013; Pai, 2015; Bernama, 2014; Alfonso, Bandalaria, & Garcia, 2014; Espiritu & Budhrani, 2013) and across the region (UNESCO, 2014). Current research literature on MOOCs generally falls into one of two categories: evaluation or design. Evaluation studies examine metrics such as student performance, usage of MOOC

resources, and student behaviors and attitudes. Design studies describe technology implementations including platforms, features, and functionalities. But MOOCs are a recent phenomenon and research on MOOCs is a young field. Many open questions regarding design, usage and impacts remain. Of particular relevance to developing countries is the question of accessibility, particularly to marginalized groups (Gais, 2014), and of learning quality (Reich, 2015).

2. A large majority of ITS development and deployment take place in the developed world (Nye, 2014; Blanchard, 2014). There is some documentation, however, of homegrown deployments in developing countries like Malaysia and Pakistan (Ting & Phon-Amnuaisuk, 2012; Kazi, Haddawy, & Suebnukarn, 2012). Mature ITS from developed countries have also been field tested in developing countries like the Philippines (Rodrigo, Sugay, Agapito, & Reyes, 2014). Likewise, ITS publications are concentrated in wealthier countries (Nye, 2014). Most ITS research in Asia, conducted since the early 1990s, originates from developed countries like Hong Kong, Singapore, South Korea and Taiwan (Cha, Kim, Park, Yoon, Jung, & Lee, 2006; Cheung, Hui, Zhang, & Yiu, 2003; Hwang, 2003; Liang & Xu, 2013). While there is evidence to suggest that the use of ITS improves learning outcomes, researchers caution that effectiveness is contextual and contingent (Ma, Adesope, Nesbit, & Liu, 2014), and that a complex of curricular-pedagogical, technological, and cultural barriers to adoption in developing countries has not been addressed by current research with sufficient breadth or depth (Nye, 2014).
3. Game-based learning research is an established field. Numerous studies over the past three decades have made claims about the positive impact of game-based learning on a range of cognitive, skill-based, learning, motivational and behavioral outcomes such as improvements in motor skills, content understanding, problem solving, collaboration and teamwork, communication, and self-regulation as well as positive changes in beliefs and attitudes (Kirriemuir & McFarlane, 2004; Randel, Morris, Wetzel, & Whitehill, 1992; VanSickle, 1986; Clark, Tanner-Smith, & Killingsworth, 2013; Sitzmann, 2011; Vogel et al., 2006; Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013). However, some recent studies suggest that there is a lack of high quality empirical evidence to support the claims of effectiveness, and that the literature on games lacks coherence, thus making progress on understanding the effects of games, developing more effective games, and proposing guidance on how best to use games in learning more difficult (Connolly et al., 2012). While research in DGBL in Asia is a relatively more mature field than either in ITS or MOOCs, the landscape remains fragmented and north-dominated.
4. LA research, like research on MOOCs, is an emergent field. Current research on LA focuses on 1) pedagogy-oriented issues; 2) contextualization of learning; 3) networked learning; and 4) educational resources management, i.e., methods for organizing and recommending educational resources (Papamitsiou & Economides, 2014). Most research on LA has been undertaken in North America and Europe; the literature on Asia is still quite limited. This is expected to change as learning management systems are increasingly used in Asian schools and education institutions. Currently, there are already attempts to analyze how big data from learning management systems can be mined to improve learner engagement and outcomes and to refine teaching and learning strategies particularly for online modalities (Jo, Kim, & Yoon, 2014; Zhou, Han, Yang, & Cheng, 2014; Zhu, Zhang, Wang, Chen, & Zeng, 2014). Most of these studies originate from developed countries—Hong Kong, Japan, Korea, Taiwan and Singapore—and from China.

B. Research agenda-setting and implementation planning

Based on these findings, a research agenda was set (Objective 3) and a plan for an Asia-wide DL4D network to operationalize the agenda was developed into a full proposal and submitted to IDRC in September 2015 for funding consideration (Objective 4). The research agenda focuses on how digital learning may be used in developing countries in Asia to address issues of equity, quality and efficiency at all educational levels, from early childhood to higher and continuing education, in formal, non-formal, and informal settings. Research on four themes -- MOOCs, ITS, DGBL and LA -- with mobile learning (ML) as a cross-cutting modality, will seek to answer four general research questions:

1. How, to what extent, and under what conditions are equity, quality, and efficiency goals being met through the adoption of digital learning innovations?
2. What are the requirements for the localization and customization of digital learning innovations given the diversity of developing country contexts?
3. What are the prospects for sustainability of effective digital learning innovations?
4. What are the possibilities and limitations for scaling up effective digital learning innovations?

Two strategies for initiating, supporting and promoting DL4D research was proposed: 1) an Asia Grant Program to fund research projects that are led by Asian researchers that test digital learning innovations and scale proven ones in developing country contexts in Asia; and 2) network-building activities that foster international collaborations and partnerships on both doing research and bridging the gap between research, policymaking and implementation.

(See Annex A for the full proposal.)

C. Inception and preparatory activities for the DL4D Network

1. *Asia Grant Program.* A Call for Expressions of Interest in the Asia Grant Program was released in June 2015, followed by a Call for Full Proposals in September 2015. A total of 28 proposals were received in October 2015. A panel of experts reviewed and evaluated the submissions and recommended eight projects for approval subject to revisions.
2. *Partnership-building.* Several partnership-building activities were undertaken:
 - a. Discussions with the All Children Reading-Grand Challenge for Development (ACR-GCD) project of USAID, World Vision and the Australian Government to co-fund DL4D research in early grade literacy.
 - b. Discussions with the UNESCO Asia-Pacific Regional Bureau in Bangkok to collaborate on regional network-building activities involving researchers, policymakers and practitioners.
 - c. Networking at the 5th International Mobile for Education Alliance Symposium in Washington, D.C. in October 2015.
 - d. Presentation of the DL4D research agenda at the BETT Asia Leadership Summit in Singapore in October 2015 *(See Annex B for the slide presentation.)*

Next Steps

Funding for the DL4D Network was approved by IDRC in November 2015. The final review and approval of shortlisted Asia Grant Program proposals is underway and sub-grant awards are expected to be made by the end of February 2016. Research projects are expected to begin by March 2016.

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