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Mobile Learning and Cognition

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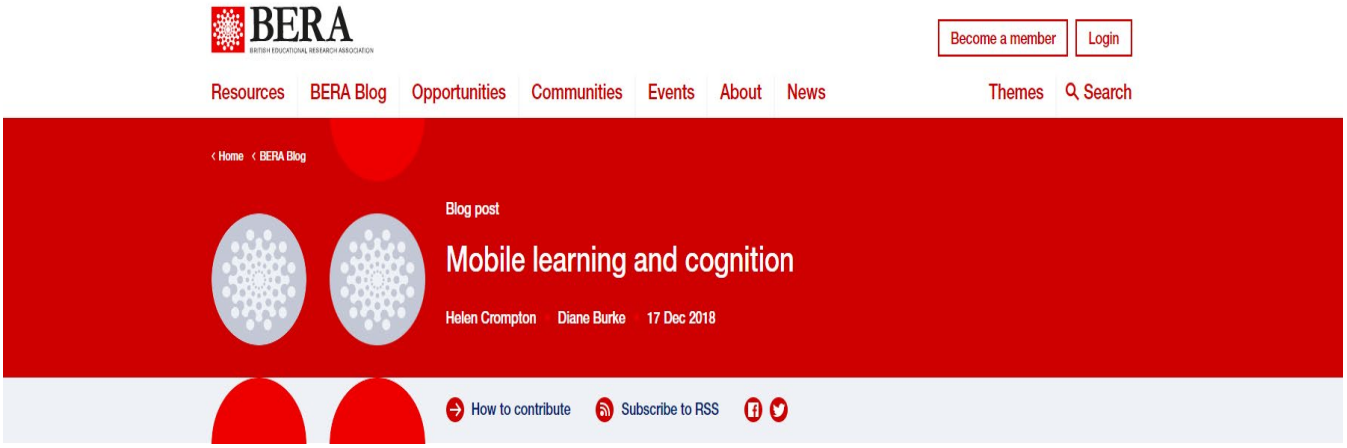

The rise of mobile learning in schools during the past decade has led to promises about its power to extend and enhance student cognitive development – for example, by providing greater pedagogical opportunities for students (Mifsud, 2014). However, others claim that mobile devices are most often used to support traditional pedagogical approaches whereby students only passively consume content (Cochrane & Antonczak, 2014; Frohberg, Goth & Schwabe, 2009; Rushby, 2012). As schools invest resources in providing students with opportunities to use mobile devices as tools for learning, it is important to critically examine their use in practice.

My colleagues and I conducted a configurative systematic review to examine what the research says about how mobile devices are being used by PK-12 students from 2010-2015 (Crompton, Burke & Lin, 2018). We wanted to determine if the published studies revealed whether mobile learning activities have students working as passive learners, of if students were using them for higher cognitive processes. We used Bloom's taxonomy of learning objectives to identify the levels of thinking that students were engaged in while using mobile devices (that is, applying, analysing, evaluating and creating content). An investigation of the top nine educational

technology journals resulted in 101 studies meeting our review criteria.
Using Bloom's taxonomy, we analysed and coded the cognitive processes that students used while engaged in mobile learning, as inferred from these studies. This helped us to better understand whether the pedagogical opportunities afforded by mobile technologies provided students with the opportunity to engage in higher-level thinking.

While data show that in 58 per cent of the studies students were working at the higher levels of Bloom's taxonomy, in a significant proportion of studies (42 per cent) students were working at two lowest levels for routine learning tasks (remembering and understanding). An encouraging finding was that students were working at the 'creating' level 32 per cent of the time.

We were interested in determining whether there was a variance in pedagogical opportunities in different grade levels. What we found was that of studies at both elementary and secondary levels, in approximately 40 per cent students were provided with opportunities to work at the lower levels of Bloom's taxonomy, and approximately 60 per cent of the studies provided opportunities at the higher levels of the taxonomy.

An analysis of subject areas indicated that science accounted for the highest number of studies (42 per cent). Science is a content area that is powerfully taught by connecting learners to real-world phenomena. These type of learning experiences are facilitated by mobile learning. The remaining distribution of studies by content area were as follows: literacy (24 per cent), social studies (11 per cent), mathematics (8 per

cent) multi-subjects (8 per cent), special education (5 per cent) and art (2 per cent).

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So, what does this all mean for both researchers and practitioners in the classroom? While the majority of studies are encouraging in that mobile technologies are being used to support higher-level thinking, more research is required to further expand our knowledge base about the effective use of mobile learning. This should include examining how mobile learning provides pedagogical opportunities that promote higher levels of thinking. What specific mobile learning activities provide opportunities for specific levels of thinking? Which functions of specific devices can be used to support learning at different levels of cognition? It might be worthwhile investigating how science learning activities support higher-level thinking, and how those activities can be transferred to other content areas.

We were encouraged by the results of our study, and hope that the results will provide others with the motivation to continue to think about and research how the use of mobile learning can help learners be as engaged as possible in their learning, at the highest levels of thinking.

This blog post is based on the article, 'Mobile learning and student cognition: A systematic review of PK-12 research using Bloom's Taxonomy', by Helen Crompton, Diane Burke and Yi-Ching Lin, published in the *British Journal of Educational Technology*. It is free-to-view for a time-limited period, courtesy of the journal's publisher, Wiley.

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