B. Chang et al. (Eds.) (2010). Joint Proceedings of the Work-in-Progress Poster and Invited Young Researcher Symposium
at the 18th International Conference on Computers in Education. Putrajaya, Malaysia: Asia-Pacific Society for Computers in Education.

1:1 Mobile-Assisted Seamless Learning: One Learning Hub? Or Multiple Devices for More Holistic Learning Experience?

Lung-Hsiang WONG
Learning Sciences Laboratory, National Institute of Education, Singapore
Lunghsiang.wong@nie.edu.sg

With research in CUMTEL ongoing for a decade and through rapid evolution, there is great diversity in the scholars' and educators' conceptual understanding and approaches to harnessing mobile and ubiquitous computing. Barbosa and Geyers' [1] view summarises the essence of one of the latest developments of mobile learning, characterised by 1:1, extensive (perhaps 24x7) access to mobile devices – it is about "increasing a learner's capability to physically move their own learning environment as they move." This would transform students into genuine "nomadic learners" [2]. Hence, this development is about creating the impact of stitching the learners' formal and informal learning contexts together to lead towards seamless learning and making their learning experiences more personalised.

Chan et al. [3] define seamless learning as a learning model where a student can learn whenever they are curious in a variety of scenarios and in which they can switch from one scenario or context (such as formal and informal learning, personal and social learning, physical world and cyberspace, etc.) to another easily and quickly using the personal device as a mediator. So, what kind of mobile device is more suitable for seamless learning?

Despite the usual criticism of the form factor and limited computing power, smartphones (or the "obsoleting" PDA's) have the advantage of instantaneous turning on and off, and being more blended or assimilated into everyday life experiences. The use of the mobile device would become a routine practice for learners and general users [4]. Rogers, Connelly, Hazlewood and Tedesco [5] argue that such devices tend to be used for short bursts of times (e.g., entering and comparing data, looking up and reviewing information, sending texts or photos to remote people, map navigation and geotagging) to support foregrounded physical activities (e.g., observing, probing, measuring) in a particular environment (e.g., city centre, forest). A potential benefit of being able to switch intermittently between activities and foci of interest is to provide multiple opportunities for students to step in and out and reflect upon these transitions. In so doing, it could deepen their understanding and help integrate their ideas, data and observations. Our 1:1, 24x7 seamless learning studies at the Primary school (in particular, Grade 3-5) level [6][7][8][9][10][11] show that smartphones can function as a personal "learning hub" that integrates various personal learning resources (including learning materials, applications and learner artefacts) at one place.

Nevertheless, the notion of 1:1, according to Cathie Norris and Elliot Soloway [12][13] is in fact "one device *or more* per student." With the proliferation of netbook as a viable laptop replacement, for 1:1, 24x7 mobile-assisted seamless learning access, we advocate each student to keep one smartphone and one netbook or notebook device at hand to handle the needs of various formal and informal, planned and incidental learning tasks. The small size and light weight of smartphones make them the perfect tool for students to perform quick and rapid learning tasks on the move. Whenever the students have the chance to sit down (either during a field trip, on the public transport, in the library, in the park, or at home), their netbooks or notebooks would compensate the limitation of computing power and screen size of the smartphones by supporting them in carrying out more "complex" learning tasks such as detailed data analysis, report writing, Powerpoint creation, learning in

virtual environments, etc. We foresee the division of labor between the two devices would bring the students a more holistic, seamless learning experience by enabling or supporting them to engage in a greater range of learning activities, which is what 24x7 access of either device could not achieve.

References

[1] Barbosa, D. N. F., & Geyer, C. F. R. (2005). Pervasive personal pedagogical agent: mobile agent shall always be with a learner. *Proceedings of the IADIS International Conference on Mobile Learning 2005* (pp. 281-285), Qawra, Malta.

[2] Brodersen, C., Christensen, B. G., Grønbæk, K., Dindler, C., & Sundararajah, B. (2005). *eBag: A ubiquitous web infrastructure for nomadic learning*. Paper presented at the International Conference on World Wide Web 2005, Chiba, Japan.

[3] Chan, T.-W., Roschelle, J., Hsi, S., Kinshuk, Sharples, M., Brown, T., *et al.* (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. *Research and Practice in Technology Enhanced Learning, 1*(1), 3–29.

[4] Chen, W., Seow, P., So, H.-J., Toh, Y., & Looi, C.-K. (2010). Extending students' learning spaces: Technology-supported seamless learning. *Proceedings of the International Conference on Learning Sciences 2010 (pp. 484-491)*, Chicago, USA.

[5] Rogers, Y., Connelly, K., Hazlewood, W., & Tedesco, L. (2010). Enhance learning: A study of how mobile devices can facilitate sensemaking. *Personal and Ubiquitous Computing, 14*(2), 111-124.

[6] Looi, C.-K., Seow, P., Zhang, B., So, H.-J., Chen, W., & Wong, L.-H. (2010). Leveraging mobile technology for sustainable seamless learning. *British Journal of Educational Technology, 42*(1), 154-169.

[7] Looi, C.-K., Wong, L.-H., So, H.-J., Seow, P., Toh, Y., Chen, W., et al. (2009). Anatomy of a mobilized lesson: Learning my way. *Computers & Education, 53*(4), 1120-1132.

[8] Wong, L.-H., Chen, W., Looi, C.-K., & Zhang, B. (2010). Analysis of attributes of mobile learning activities: Two case studies of m-learning design. *China Educational Technology, 2010*(2), 7-15.

[9] Wong, L.-H., Chin, C.-K., Tan, C.-L., & Liu, M. (2010). Students' personal and social meaning making in a Chinese idiom mobile learning environment. *Educational Technology & Society, 13(*4).

[10] Wong, L.-H., & Looi, C.-K. (2010). Vocabulary learning by mobile-assisted authentic content creation and social meaning-making: Two case studies. *Computer Assisted Learning, 26*(5), 421-433.

[11] Zhang, B., Looi, C.-K., Seow, P., Chia, G., Wong, L.-H., Chen, W., et al. (2010). Deconstructing and reconstructing: Transforming primary science learning via a mobilized curriculum. *Computers & Education, 55*(4), 1504-1523.

[12] Norris, C., & Soloway, E. (2002). *Keynote speech*. IEEE International Workshop on Wireless and Mobile Technologies in Education 2002, Växjö, Sweden.

[13] Norris, C., & Soloway, E. (2004). *Keynote speech*. International Conference on Intelligent Tutoring Systems 2004, Maceio, Brazil.