A self-configurable cloud-based system to support personal active learning

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1. Introduction

The initiative behind the Personal Learning Environment & Network (PLE&N) project came from the need for today's learners to build and operate their own customized personal learning portal while being able to receive up to date relevant information and share their knowledge and experience, on an ongoing basis and free from the restriction of any academic constraints e.g. classroom, enrolment, semester period etc. with their classmates and peers easily. Such a need led us to develop and deploy a cloud-based learning system that can be customized for groups of learners and support them with active and continuous learning in a blended environment. The objectives set for this project involve identification of the major stereotypes of learners as well as locate the appropriate tools, data sources, and learning content suitable for supporting each type of learner. Once these prerequisites are available, a (customizable) prototype system was developed to carry out trials and evaluate the effectiveness of the prototype system for supporting personal active learning for various groups of learners.

2. Research Methodology

The first phase of this project mainly included conducting interviews; identifying learning and career needs of the interviewees, categorizing students into different categories based on common learning and career needs, identifying tools for evaluation based on project objectives, and proposing toolsets that fit into different student stereotypes [1]–[3]. The second phase of the project included trialing the system in selected subjects, collecting feedback on the system, and compiling the report for the project[4], [5].

Two subjects, "Methods and tools for Knowledge Management Systems" and "Knowledge Communities" were chosen from the MSc. in Knowledge Management program at the Hong Kong Polytechnic University for this trial. For each of the trialed subjects, a small number of in-class lectures was replaced by "flipped classrooms" (Objective 1). Selective components for assessment was re-designed so that proper and regular use of the prototype system could indeed assist learners to better tackle the assessment components (Objective 2)[6], [7]. Learning outcomes for the overall class was compared with previous learning outcomes for the same subject delivered in previous years (Objective 1 and 2). Follow-up interviews was also conducted with selective students and graduates to ascertain if they continue to leverage the resources of the prototype system and how they assess the system's effectiveness in supporting their active and continuous learning and career growth (Objective 3)[8], [9].

The interview questions were designed to identify student stereotypes and ascertain their learning and career needs. Most interview questions were open-ended in order to explore more the interviewee's background, motives of learning as well as their learning experience. Follow-up questions were also raised based on the interviewee's answer during the interview. All interviews were timed and the results are kept in the interview log and stored as a Google Doc document.

In addition to the core questions to identify student stereotypes and ascertain their learning and career needs, a few additional questions about the students' life-long learning needs were added to the end of the interview. The reason for adding in these questions was that PLE&N is designed to be long term and needs to be self-sustainable. The PLE&N has to be a principal part of a person's life-long learning journey [10], [11].

A list of tools was preliminarily selected based on the following basic needs and criteria:
1. Cloud-based
2. Multimedia-oriented
3. Free
4. Massive connectivity
5. Learner-centric
6. (Near) Unlimited Storage capacity
7. Easy to configure and allow flexible changes
8. Tools exist to support basic functions e.g. read, tag, share, comment/annotate, create etc.
9. Sourcing and rating of learning content
10. Location of expertise
11. Collaboration tools
12. Community tools

Based on the above criteria, Google+, Feedly, Google Docs, Facebook, Twitter, Linkedin, Skype, Youtube, Dropbox and Whatsapp were the major preliminary tools that was introduced to the users..

3. Data Collection and Analysis

Data were collected through interviews to figure out the learning and career needs of the students. A total of 13 students were interviewed consisting of undergraduate students, part-time postgraduates, and research students. All interviews were face-to-face interview and one is conducted on the phone. The duration of an interview was around 40 minutes with a levy of 10 minutes. The format of the interview was semi-formal which means that the interview is intense but also in a two-way communication way. Gratitude went to the interviewees who volunteered their time for the interview. Also, the interview was not just for obtaining information, but also to make interviewees think on their own feet. For example, interviewee was asked what their ideal personal learning environment (PLE) is and how this ideal PLE can take them to their key goals in a better way, etc.

Table 1 shows the summary of the interview results by these student prototypes.

Table 1. PLE&N Interview Summary

Student Profile	Experience	Learning and Career Needs
Final year undergraduate students	All the interviews have not had full-time experience, though some of them have had internships.	Overall, the full-time undergraduate students' learning needs are centered around 1) earning good grades, 2) building up skillsets and 3) exploring their interest to find the desired pursuit of development area. As they are still in their undergraduate study, students have different levels of consciousness of their career needs depending on the student's maturity level. In general, for those who are more certain about their desired pursuit of career development, they are more aware of the importance of 1) learning from senior people in the field, 2) honing skills through internships and 3) active preparation for their career. However, no matter how conscious they are of their career needs, they all place value in career-related information especially internship opportunities.
Part-Time Master of Science Students	All of them are experienced and have full-time employment in companies of IT, construction and social work.	Overall, the part-time MSc. in KM students' learning and career needs are centered around 1) better organization of knowledge, 2) communicate and collaborate well with others and 3) facilitating connections
Full time Research Students	All of them have more or less some work experience before their research study.	Overall, the full-time research students' learning and career needs are centered around 1) communication and discussion platform with more features such as recommendations, 2) platform for obtaining and organizing different sources of knowledge and 3) File-sharing system

References
[1] R. K. F. Cheong and E. Tsui, "The roles and values of personal knowledge management: an exploratory study," *VINE*, vol. 40, no. 2, pp. 204–227, May 2010.
[2] W. B. Lee, C. F. Cheung, E. Tsui, and S. K. Kwok, "Collaborative environment and technologies for building knowledge work teams in network enterprises," *International Journal of Information Technology and Management* , vol. 6, no. 1, pp. 5–22, Jan. 2007.
[3] N. Dabbagh and A. Kitsantas, "Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning," *The Internet and Higher Education*, vol. 15, no. 1, pp. 3–8, Jan. 2012.
[4] S. H. D. Fiedler and T. Väljataga, "Personal Learning Environments," *International Journal of Virtual and Personal Learning Environments*, vol. 2, no. 4, pp. 1–11, 2011.
[5] G.-J. Hwang and H.-F. Chang, "A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students," *Computers & Education*, vol. 56, no. 4, pp. 1023–1031, May 2011.
[6] S.-W. Chou and C.-H. Liu, "Learning effectiveness in a Web-based virtual learning environment: a learner control perspective," *Journal of Computer Assisted Learning*, vol. 21, no. 1, pp. 65–76, Feb. 2005.
[7] G. van den Boom, F. Paas, J. J. G. van Merriënboer, and T. van Gog, "Reflection prompts and tutor feedback in a web-based learning environment: effects on students' self-regulated learning competence," *Computers in Human Behavior*, vol. 20, no. 4, pp. 551–567, Jul. 2004.
[8] S.-L. Wang and P.-Y. Wu, "The role of feedback and self-efficacy on web-based learning: The social cognitive perspective," *Computers & Education*, vol. 51, no. 4, pp. 1589–1598, Dec. 2008.
[9] B. J. Zimmerman, "Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects," *American Educational Research Journal*, vol. 45, no. 1, pp. 166–183, Mar. 2008.
[10] H. Drachsler, H. G. K. Hummel, and R. Koper, "Personal recommender systems for learners in lifelong learning networks: the requirements, techniques and model," *International Journal of Learning Technology* , vol. 3, no. 4, pp. 404–423, Jan. 2008.
[11] R. Koper, B. Giesbers, P. van Rosmalen, P. Sloep, J. van Bruggen, C. Tattersall, H. Vogten, and F. Brouns, "A design model for lifelong learning networks," *Interactive Learning Environments*, vol. 13, no. 1–2, pp. 71–92, Apr. 2005.