

Proof of Concept for Learning Analytics

- using Radium-JS. Caliper API and open source Big Data platform SW

Challenge: from heterogeneous data sources to adaptive recommendation

Due to heterogeneous data sources of learning activities and environments, it is hard to gather learning data in a systematic way. Thanks to the standardization efforts pertaining to IMS Caliper and xAPI somewhat data capture issues seems to be resolved. However, it is still challenge for institutions not only how to use gathered data but also what kinds of system works for data analytics. In addition, recommending appropriate learning pathway with digital resources for learner at a specific point in time to learners is to be serious challenges to institutions. In summary, almost stakeholders pertaining to institutions want to understand whole processes for learning analytics from data collection to recommendation, and need to identify information to recommend personalized learning pathway.

Solution: reference model and reference SW for learning analytics in terms of proof of concept

To prove hypothesis of this R&D for learning analytics and adaptive learning, the R&D team has identified at least two parts of research required. First part is unit chunks for curriculum and achievement statements those which can be human and machine readable format. The unit nodes of curriculum and achievement statement will be used the nodes for customized learning pathway. The other part is reference model and software that can flow data from data collection, filtering, analysis, visualization and recommendation to learner.

According to ISO/IEC 14776-414, the reference model and software means a standard model used to specify system requirements in an implementation-independent manner. The R&D team has chosen open source software, such as Hadoop, Impala and R to deploy reference model for data analytics. Improving usability Radium and Moodle are good reference software in terms of learning environments connected with data analytics platform. In addition, IMS Caliper and Learning Tools Interoperability can be easily adopted on Radium and Moodle to capture learning activity data. This composition, in other words, is called as adoption of EDUPUB. Attraction of this reference model is that unit processes – data capture, data storing and filtering, analysis, visualization (or reporting) and recommendation – could organize independently like LEGO blocks.

Learning Impact Outcomes: from real time engagement and adaptive learning

Current learning service is focus on average group of whole class or school, and it causes to alienate some students those who cannot follows average progress. Through the learning analytics, in particular adaptive learning, learners can mainly expect better service than before as below:

- Improved feedback from analyzing activities and assessments
- Personalized learning pathway and/or resources (recommendation)
- Early detection of failure to achieve personal potential

Recommendation for personalized learning pathway and resources can save students' time to search or organize courseware. Furthermore, students can check their progress on the dashboard presented whole status of learning activities. In general, this research expects benefits for learners as below:

- tracking learning activities and progression
- tracking emotion, motivation, and learning-readiness
- discovery and/or refinement of individual accessibility preferences
- improved feedback from analyzing activities and assessments
- early detection of failure to achieve personal potential
- personalized learning path and/or resources (recommendation)

This R&D is under pilot testing at a courseware of university as well as supportive program of STEM at primary schools. The goal of this R&D is to build 20,000 of LOD node for curriculum related to STEM, up to 90% of accuracy for recommendation of analytics model, and improve 20% learning outcome compared with regular group those who are not using learning analytics service.

Return on Investment: right recommendation and improvement learning outcome

Learning analytics can help data-driven decision making for investment of institution on its development LMS/VLE and digital resources. Through learning analytics decision maker can get insights what they need to invest more and reduce the cost for management. The beauty of reference model and open source SW is affordability to take pilot and test prior to implement or invest for their target system and/or service.

By recommending the right learner in the right courses and material real time, institutions and learners can drive positive returns in the form of cost and time for efforts. Moreover, by showing what they know and do not know as well as their attitude, pattern and preference to students, learners can improve their engagement ratio and enjoy deeper learning. In near the future this reference model and architecture may meet machine-learning process which will be replaced with analytics process, and then more cost-saving and high learning outcome come true.