**Integrated framework for educational material development based on linked data supporting learning analytics**

With the advancement of current ICT (Information Communication Technology), e-learning plays an important role in higher education that can individualize learning, enhance learners’ interactions with others, and transform the role of the teacher. To improve teaching and learning environment, Kyushu University has adopted Bring Your Own Device (BYOD) for all the students, and the university also provides an e-learning management system called M2B (Moodle, Mahara and BookRoll). Our research focused on BookRoll, an e-learning material viewer that allows LA (Learning Analytics) by recording students reading log data of e-learning materials. On the other hand, for high efficiency of learning, such e-learning materials should support multimedia. However, there is no e-learning material development framework that helps educators to develop e-learning materials of multimedia in a certain format like ePub. In this research, we proposed an integrated framework for educational material development that helps educators to develop e-leaning materials in ePub format and supports LA.

There are four remarkable items to realize our research objective. 1) Linked Data technology for collecting and managing multimedia resources of e-learning materials spread over the Internet. 2) Authoring tool for enabling educators to develop e-learning materials using the database realized as Linked Data. 3) Development of e-learning material in ePub format using the multimedia resources retrieved from the authoring tool. 4) Web-based viewer supporting Learning Analytics for e-learning materials in ePub format, realized by modifying ePub.js to add the functionality to collect learning activity data. The remaining item is to perform LA by visualizing the learning activity data collected from the web-based viewer with the use of any already existing visualization tool.

As explained above, this research proposed the integrated framework for educational material development based on Linked Data which supports LA. As case studies, we developed educational materials of IoT security and Japanese history in ePub format and ask some students to use the web-based viewer for reading such materials. Then, we confirmed that reading log data can be collected and visualized using visualization tools of our laboratory.

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