Invited Paper

The Meaning of LOM and LOM Authoring Tool on HRD

Kenji Hirata,
The Sanno Institute of Management
HIRATA_Kenji@hj.sanno.ac.jp

Yoshiyuki Takaoka, Mamoru Ohta,
Toko Seiki Co.
charly@osa.att.ne.jp
ohta@cdd.toko-s.co.jp

Mitsuru Ikeda
Osaka University
ikeda@ei.sanken.osaka-u.ac.jp

Abstract

Activity for standardization about educational information is prosperous internationally. The LOM standard is meta-data about learning objects. Learning objects are every types of teaching materials, learning materials, lecturers and organizations etc. LOM is important not only to spread E-learning, also to realize the effectiveness of information technology for education, training and learning. Primarily we looked back on the scope and the purpose of the LOM standard. Then we described the meaning of LOM clearly on HRD from two sides; contents oriented study and design support. Finally we introduced the LOM authoring tool that we had developed. This tool can support to describe contents of learning objects by LOM with vocabulary related to HRD needs. These LOM are a basic technology in order to provide appropriate learning objects which meet with needs for various participants on HRD.

1. Introduction

It has been considered LOM (Learning Object Meta-data) in IMS [1]. IEEE LTSC, Learning Technology Sub Committee, established the P1484.12 as LOM Working Group (WG), which also have considered and promoted LOM for Standardization. These activities are closely related to each other. LOM WG in LTSC already has submitted the Draft ver.6.1 [2]. Even ISO/IES JTC1 SC36 is due to examine in near future.

A LOM is a meta-data about a learning object. A learning object is "a Entity" utilized in education, training and learning. The Entity means multimedia resources and materials, educational materials and tools, by a case, it included lecturers and firms or organizations. And also it can include both digital and non-digital information. In some cases, Learning Objects may be called "Educational Resources" and/or "Learning Contents". Like these called name helps you understand of the concept about Learning Objects generally.

But we need to understand it from standpoint of technology. The LOM standard is a concept schema to define data structure of meta-data for learning objects. And, using this concept schema, we can appoint each instance adopted more than one as meta-data for Learning Objects. LOM, which extends in depth, should be referred to from other standard. Therefore LOM is a base technological standard to make learning object circulate and utilize learning systems. It is one of most important standard for Interoperability [3].

2. Purpose of LOM

The basic way of LOM is to avoid that learning objects can be shared and used only on a specified system or a platform. In other words, it is to turn a learning object into the data form that does not depend on a specific system or a platform. The purpose of the LOM standard is to facilitate search, evaluation, and use of learning objects, for instance by learners or instructors. The purpose is also to facilitate sharing and exchange of learning objects, by enabling the developmental catalogs and inventories while taking into account the diversity of cultural and lingual contexts in which the learning objects and their and their meta-data will be exploited [2].

By specifying a common conceptual data schema, this standard ensures that binding of LOM will have a high degree of semantic interoperability. As a result, transformations between binding will be straightforward. As for using LOM, a description by common data expression becomes possible in order to appoint a common concept schema [2].

3. Constitution of LOM

Basic structure of the LOM is roughly classified category and data element as “Branches”, and value lists or vocabulary etc. as “Leaves” [1]. There are nine clusters of category; General, Life cycle, Educational, Rights, and Classification et al., and there are about less 60 data elements or sub data elements. A most of element or sub element will have data, value, vocabulary or semantics.

4. Role and Meaning of LOM in HRD

It is necessary for promotion of information to prepare and to spread infrastructure and environment of hardware. In the side of promotion of information in education, in addition to the above, it is needed to focus

https://doi.org/10.23106/dcmi.952106803

whether we can educate and/or learn efficiently and effectively. So we considered that a role of LOM was explained from two studies [4], if this promotion could be advanced. Based on these viewpoints, we discussed the role and meaning of LOM in the Engineering research.

Primarily, using LOM is able to accelerate the substantiality both aspects of quantity and quality of learning contents. We cannot expect a lot of effects, if we can process only limited number of learning contents in actuality. In this case, it may be difficult for computer to perform its function beyond human processing ability. Therefore the environment to process a lot of learning contents is necessary for information in education and also utilization of LOM. Moreover we need to cope with the demand of users adequately, and then learning contents will be able to share and to reuse. A basis to process data in large quantities becomes necessary. LOM may become just the basis technology. On the other hand, in an aspect in quality, Contents-Oriented study becomes necessary [5]. This engineering study is to actualize and to define knowledge in educational design and learning design so that computer can treat contents and its data.

Secondarily, using LOM is able to accelerate environmental preparation for various users who are related to education, learning and its management operation. Education and learning do not occur in closed system such as the relationship between learner and teacher or learning materials. These occur in opened system such as the community where the various persons participate. Therefore a total design is needed. Using LOM is able to support to design with computer for not only a specified function but also total one that is related to various persons and systems. Integrated information processing among various functions, systems and persons is an important theme in an artificial intelligence [6].

4.1. Contents Oriented Study

It seemed to us that using LOM was to specify a concept including form and contents of learning objects. It can be said broadly that LOM deals with "intellect" in education. For example, thing that should be taught and delivered in a organization is important for a organization. This is just called knowledge or skill, which mean intellect, in company training and development.

A vocabulary is a index information as a key word fundamentally. But with passing through process of standardization, a vocabulary becomes effective for understanding of contents of learning objects, in other words, it is able to make mutual agreement about a concept possible for persons in same domain. Then a vocabulary has enough expression power. These functions of LOM have important meaning for knowledge processing and Knowledge Engineering. In addition to data modeling that describe the relationship among vocabularies, a set of vocabulary is able to be recognized an ontology [7].

In Intelligent Content study, importance of standardization was pointed out. Share and reuse of intellect progress over large range by standardization. Because LOM basically has the intention to appoint a basic schema of learning objects, some LOM categories can describe the contents about learning objects, the following things become possible. For example, it is easier to design of educational course, to manage learning activity, and to develop software; sequencing learning objects. From the viewpoint of HRD theory, we can consider learning objects to be individual and organizational knowledge or intellect. That is, as for LOM, there is meaning as basis technology of Knowledge Management.

4.2 Design Support

The most important agents in education are designers, executors such as instructors, and learners. When education executes, according to it, learning occurs on each learner. Designer and also executor need to predict and plan both educational activities and learning activities. Before executing education, the mutual agreement formation about educational objectives, contents, and methods is necessary between designer and executor. And learner dose only react to stimulation of instructor, but learner constructs knowledge and behavior oneself. Before executing learning, the mutual agreement formation about learning objectives, contents, and educational methods is necessary among learner, designer and executor.

We note in case of education that it is too difficult to contract on the basis of logical function among these agents. Therefore the mutual agreement formation is very important. Based on the mutual agreement, education is executed, and based on it, evaluation is executed.

While on HRD, there are various activities, systems and persons to accompany training and development. Supports for them with information technology are required to manage, to search, to share, and to reuse learning objects. LOM is only a tag for the learning management, or only an index in specific system for search in Web, but LOM will be a reference model for total process on HRD and for all HRD participants. LOM will be used through HRD design process, in other words it is a total design, thus it contains organizational and individual level needs analysis, objectives setting, learning object and course development, instruction, and evaluation. Especially on HRD, LOM has the important meaning that LOM can offer the environment to utilize learning objects commonly. We can position LOM in the person whom

https://doi.org/10.23106/dcmi.952106803

LO participates in a circulated process as a reference model to which a system refers (Figure1) [8].

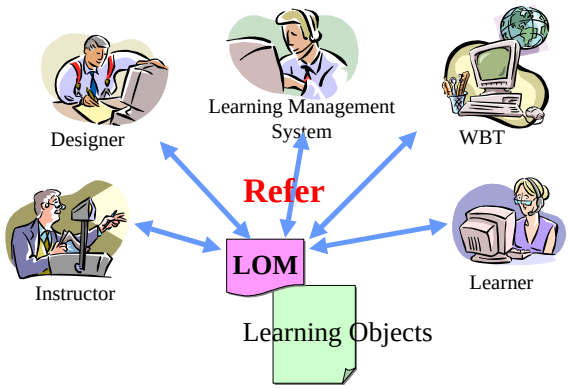

Figure1 LOM as a Reference Model

5. Outline of LOM Authoring Tool

We have developed various systems in order to design of effective education and learning from the viewpoint of the Contents-Oriented approach. So these system have been developed to use LOM or with using LOM. In this paper, we show the outline of one of tool, which is LOM authoring tool. This tool supports for LOM developer through serial activities that include development and management of LOM.

5.1 Function

This tool has some functions as follows.
1) LOM Editing function
This function is to develop LOM and to edit element data for learning objects that are designed and developed. And this has the function to save LOM record as XML date form.
2) Data Management function
This function is to save learning objects and LOM, and to inspect LOM. And this has also database management function.
3) Optional function
For each educational need, this function is to set LOM category and elements up, and to set vocabulary up.

5.2 System Development

Figure2 shows the interface of this tool that we developed. This interface consists of following five windows.
1) LO/LOM Management Window (①the top of left)
This indicates a title of learning objects and LOM category and element. We can select, save and delete about LOM instance in this window.
2) LO/LOM Property Window (②the bottom of left)
This indicates management information about learning objects and LOM.
3) Learning Objects Window (③center)
This is shown a learning object itself.
4) LOM View Window (④the top of right)
This indicates LOM category structure and elements. We can refer and select a instance to edit.
5) LOM Edit Window (⑤the bottom of right)
In this window, we can edit LOM instance selected in view window.

5.3 Vocabulary Development

The "Classification" which is one category of LOM gives precision expandability to meta-data. It is an important category to provide information about contents of learning objects. We pointed to importance of contents oriented study mentioned above by Chapter4.1. Therefore we did focus into development of some sets of vocabulary to refer to classification category in particular. From the viewpoint of HRD, we considered with various needs to education in company and organization.

So we made the following some sets of vocabulary corresponding to needs from various designers and learners on HRD. In making, we based on well-known or well-defined taxonomy or standard in each domain fundamentally, and we reviewed a lot of researches, especially about psychology and business

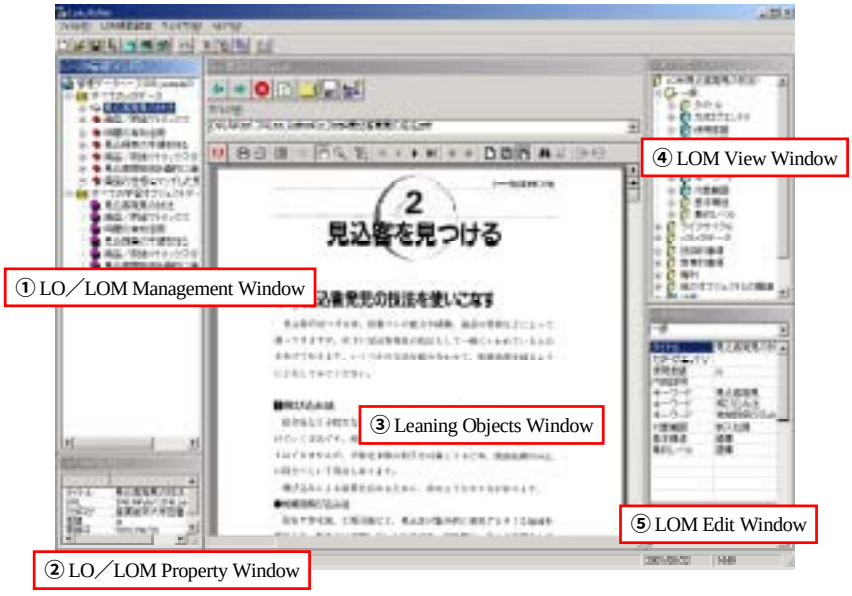

Figure2 LOM Authoring Tool Interface

https://doi.org/10.23106/dcmi.952106803

administration study.

1) Vocabulary set of Human Competency
2) Vocabulary set of Knowledge Related to Vocation vocabulary
3) Vocabulary set of Management
4) Vocabulary set of Information Technology
5) Vocabulary set of Expertise and Skilled Level
6) Vocabulary set of Position; official role and rank
7) Vocabulary set of Occupation
8) Vocabulary set of Qualification / License related to occupation
9) Vocabulary set of Industry classification

All of these sets of vocabulary can be set LOM up this tool.

6. Conclusion

Currently, nine sets of vocabulary that we developed did not function fully in this tool. That is, each is utilized solely. It is a future theme to describe needs of various participants on HRD with relevance among these sets of vocabulary.

And, as a system, this tool only operates in standalone environment. This should be utilized in network environment. And, instead of tool as simply information retrieval, we are going to develop a learning system corresponding to workplace learning and knowledge management.

7. Reference

[1] IMS: “Learning Resource Meta-data Best Practice and Implementation Guide. Specification ver.1.2” 2001.
[2] IEEE LTSC: “Draft Standard for Leaning Objects Meta-data. p1484.12 /D6.1.” 2001.
[3] Hirata,K: “LOM Guide Line for HRD ver.1.0. Chapter2” 2001. ALIC LOM WG.
[4] Hirata,K., Ikeda,M. and Mizoguchi,R: “Total Resolution for Huma Resource Development Based on Competency Ontology”. ICCE2001 (in print)
[5] Mizoguchi,R.: “Ontology: Foundation and Applications”. Journal of Japanese Society for Artificial Intelligence. vol.14. No.16. 1999
[6] Hashida,K.: “Intelligent Contents and Intelligent Shearing”. Proceedings of the 13th Annual Conference of JSAI, 1999.
[7] Mizoguchi,R: “Towards Ontological Engineering” Proceedings of the 12th Annual Conference of JSAI, 1998.
[8] Ohota,M.: “LOM Guide Line for HRD ver.1.0. Chapter3” 2001. ALIC LOM WG.
[9] Hirata,K., Mizoguchi,R. Ikeda,M. et al., “Effectiveness of Human Resource Ontology”, JCET 2000.

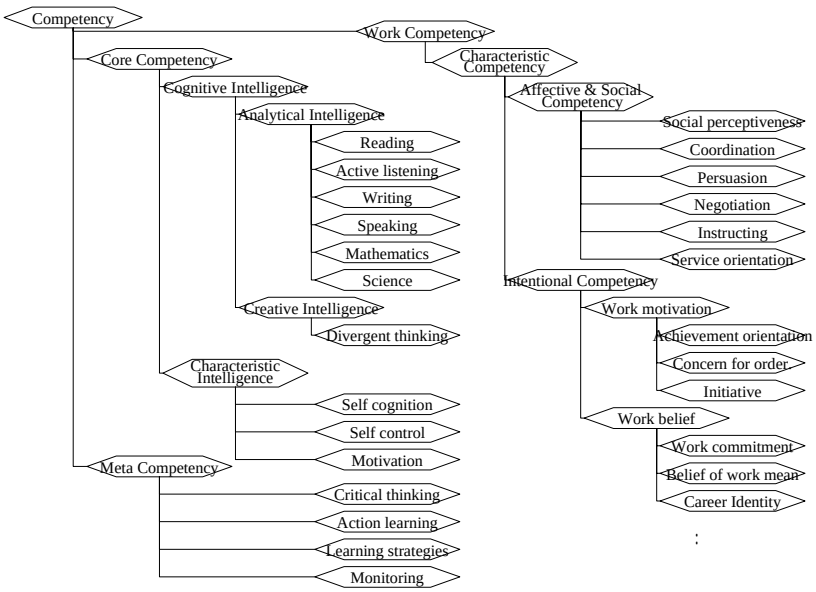

Figure3 Competency Vocabulary [9] - part of -

https://doi.org/10.23106/dcmi.952106803