From Overview to Application of SCORM

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In the coming reports, I will introduce the standard specification SCORM for e-learning content. I'm covering its history this time.

Significance of Technical Standardization

First, let's consider the significance of technical standardization in products such as industrial goods. As some examples that familiar to everyone, I'll take the electrical products' plugs and sockets. When purchasing an electrical product like a hair dryer, do you think about whether "Will this hair dryer's plug fit into my home's socket?" or " Will the voltage be correct?" Rather than worrying about such questions, you may think about whether "Can I dry hair quickly?" or "Does the design match my preferences?". Fortunately, you don't have to worry about the plug not fitting or the voltage being incompatible. This seamless compatibility is the result of technical standardization. The shape of plugs and sockets, voltage, frequency, etc., for electrical products is determined by standard specifications. However, standards differ between Japan and overseas, so when traveling abroad, you may need to worry about whether "Will this hair dryer's plug fit into the hotel's socket?"

Such standards can be found in various industrial products. Examples include DVD and Blu-ray discs in video recorders, USB interfaces in PCs, and Wi-Fi communication protocols. The common feature of these standards is that they divide the components of a product or system into "modules" and specify well-defined interfaces between the modules. For example, in the case of DVD, a video recorder and a DVD disc are "modules," and "interfaces" such as disc shape and recording/playback methods are specified between modules.

By specifying such a standard, users of the product can freely select modules. For example, a video recorder and a DVD disc do not have to be made by the same company. This means users can prioritize video quality in the recorder and price in the disc, selecting products from different companies. Additionally, if a video recorder becomes outdated and is replaced with a product from another company, previously recorded videos on DVD discs can still be played back.

For product providers, standard specifications also bring benefits. For instance, a company manufacturing hard disks for PCs can connect its hard disk to various companies'

PCs by adopting the USB interface. Without such standard specifications, if each company's PC had a different hard disk interface, the hard disk manufacturing company would need to produce disks tailored to each interface, leading to increased product development time and manufacturing costs.

Technical Standardization in e-Learning

Next, let's consider technical standardization in the field of e-learning. In e-learning, Learning Management Systems (LMS) are commonly used to manage user information, instructional content, learning log, etc. Here, we'll focus on content, although each of three could be subjects of technical standardization.

The relationship between LMS and content is similar to the relationship between a video recorder and a DVD disc. If there is a standard specification for content, LMS users can purchase content with the required subject from various companies, considering factors like price. Moreover, if custom content is needed, users can choose authoring tools that comply with the standard specification to create their own content. Without a standard specification, users might be limited to content and authoring tools that match a specific LMS format. Even if they want to replace an outdated LMS with a better one from another company, they might need to recreate all the content.

In fact, looking back at the history of e-learning, it can be said that this concept of standardization is relatively new. The idea of using computers for education has existed since the advent of computers. This movement took shape with the spread of microcomputers and personal computers in the 1970s and 1980s. Systems called CAI (Computer-Aided Instruction) and CBT (Computer-Based Training) are emerged, and multimedia technology-based instructional materials packages were developed. At that time, however, the Internet had not yet become widespread, and these packages of educational materials were sold individually on CD-ROMs and other media. Later, in the 1990s, the Internet and WWW became widespread, and systems called WBT (Web-Based Training) appeared. In these systems, multiple learners access content placed on a Web server via a network, and a function that manages learners and obtains their learning log and allows instructors and administrators to view learners' learning log and check their learning statuses has become common. In addition, these systems have defined their own content formats, and some of them allow users to create their own content with dedicated authoring tools. However, the content format varied from product to product, and content could not be transferred to other companies' systems. Then, around the end of the 1990s, there was a movement toward technical standardization for sharing and distributing content between different WBTs and LMSs, and the SCORM (Sharing Content Object Reference Model) standard was introduced in the 2000s.

SCORM Structure and Standardization

SCORM includes SCORM 1.2, released in 2001, and SCORM 2004, released in 2004. Both standards assume that learners access content on a web server (LMS) using a web browser. SCORM content consists of a file that specifies the table of contents structure and multiple web contents corresponding to each page of the table of contents. When a learner logs into the LMS and starts the SCORM content, the LMS displays the Web content in the learner's browser according to the structure of the table of contents.

The Web content is general HTML content, and multimedia content such as audio and video can also be used. SCORM defines an API for exchanging information between Web content and the LMS. The test contents can use this API to send learning log information such as learners' answers, scores, and time required to complete the test to the LMS.

On the other hand, SCORM does not set any restrictions on the format of test questions or scoring methods. This is in contrast to many proprietary WBTs, which specify the test format, scoring rules, hint functions, etc., in advance and only allow content creation and learning log information storing within the scope of these specifications. In anticipation of subsequent advances in HTML and browser technology, the design philosophy of SCORM was to specify only the API between Web content and the LMS, and not to impose any functional restrictions on Web content.

The above features are common to both SCORM 1.2 and SCORM 2004, and allow users to present Web content, check comprehension with tests, and store learning log. In addition to these features, SCORM 2004 adds a sequencing feature that allows the LMS to select and display pages of Web content based on the learner's test scores. This feature allows for learner adaptation, such as skipping pages that the learner understands, or displaying supplementary pages for topic that the learner did not pass on the test.

References

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