Encouraging In-House Development of Digital Learning Materials

Takahiro Kagoya

Professor, Faculty of Human Life Studies, Jin-ai University

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The advancement of Information and Communication Technology (ICT) has significantly transformed educational and learning methods. For instance, the enhancement of online learning platforms now enables access to high-quality courses outside of classrooms and supports inquiry-based learning utilizing vast information resources. Moreover, the widespread use of cloud services and mobile devices has minimized the constraints of time and space in learning. The diversification of information media, including not only text and images but also audio and video, has led to the provision of more comprehensible learning materials. The widespread availability of tools such as word processors, presentation software, and software for recording and editing videos has made in-house development of learning materials increasingly accessible. The developed materials can be provided as files through CMSs (Content Management Systems) or LMSs (Learning Management Systems), forming the structure of learning courses. LMSs also come equipped with features like quizzes, surveys, assignments, and forums to support learning activities, enabling educators to assess learners' understanding and provide feedback.

However, when aiming to provide more interactive learning materials, the barriers to in-house development can become significant. Creating user interfaces and functional content from scratch often requires programming skills and expensive tools, which may not be affordable or readily available. Additionally, aligning the content with specific platforms can be challenging.

H5P Content Framework

H5P is a tool that enables the easy creation of interactive content. H5P is an open-source content framework developed to facilitate content creation, sharing, and reuse, and is compatible with various CMSs and LMSs. Previously, in Moodle, H5P required installation as a plugin, but it is now integrated as a standard feature in the Content Bank. H5P provides a variety of content types that can be created by selecting options such as text, images, audio, and video on the web.

For example, H5P allows the creation of content that goes beyond traditional materials, encouraging active learner engagement through tools like "Interactive

Video" and "Course Presentation." "Interactive Video" enables the addition of quizzes and supplementary information within videos, providing learners with an interactive experience where they actively understand the content while watching. "Course Presentation" organizes information into slide formats while incorporating interactive elements like multiple-choice questions and drag-and-drop activities to enhance knowledge retention. Other content types range from simple functions to the creation of educational games.

The adaptability of H5P is another key feature. Once created, H5P content can be shared and reused across various platforms. For instance, H5P content can be published on WordPress websites, exported as a standalone package, and integrated into Moodle courses. It can also be embedded into other websites using iframe codes. This level of flexibility is highly beneficial for designing educational materials that accommodate diverse learning environments and devices.

Quiz results and grades from H5P content are displayed per content item and, depending on the content type, can also be summarized on a results screen. These results can then be integrated with the associated CMS or LMS. In Moodle, for instance, results are reflected in the Gradebook API, allowing educators to combine quiz scores with other course activities to evaluate and support learners.

H5P enables educators to drastically reduce the time required for creating learning materials while providing engaging and effective content for learners. This tool is particularly valuable for designing interactive learning experiences that help learners deepen their understanding. Additionally, H5P does not require coding skills, making it accessible for educators who are less experienced with ICT tools.

Examples of In-House Content Development Using H5P

Microlearning is a teaching method that focuses on short, topic-specific learning sessions, enabling efficient knowledge acquisition and retention. This approach could be incorporated into children's education. Therefore, I created H5P content using elementary school teaching materials as examples. For example, in Japanese language studies, content was created to help students to learn the names of kanji radicals. In mathematics, students could identify similar shapes, and in science, they could arrange the growth stages of insects in the correct order. Additionally, in social studies, learners could locate prefectures on a blank map, while in English, vocabulary cards were designed to allow students to listen to a word and flip the card to reveal the correct answer.
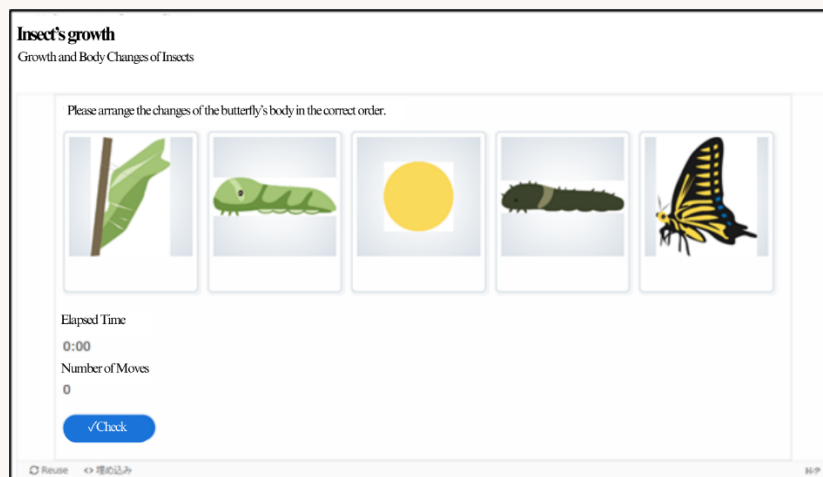
Figure 1：Insect's growth

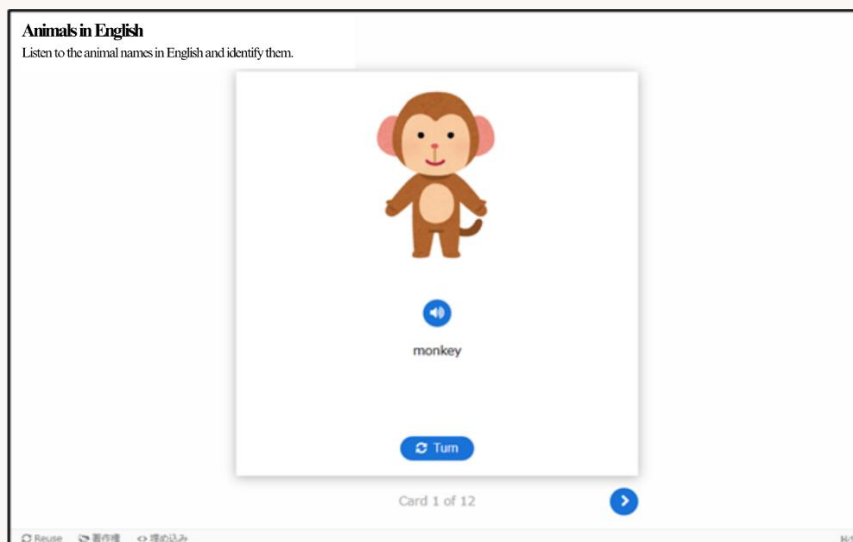
Figure 2：Animals in English

Figure 1 shows a quiz where learners arrange images of an insect's growth stages in order using the "Image Sequencing" content type. Dragging five image cards to align the stages from egg to butterfly, learners receive immediate feedback on their accuracy.

Figure 2 shows content featuring animal vocabulary cards in English. By clicking the speaker icon in the center, users can listen to the pronunciation of the English word written below. Pressing the Turn button flips the card to reveal the Japanese translation. This content was created using the "Dialog Cards" content type, reproducing a set of 12 cards.

Figure 3 shows a matching game where learners pair cards showing animal illustrations with corresponding names. Preschool children played the game on

tablet devices, and each time a card was flipped, the sound of the animal played. The children eagerly flipped the cards and, as they played, they gradually learned to recognize and read the animal names.
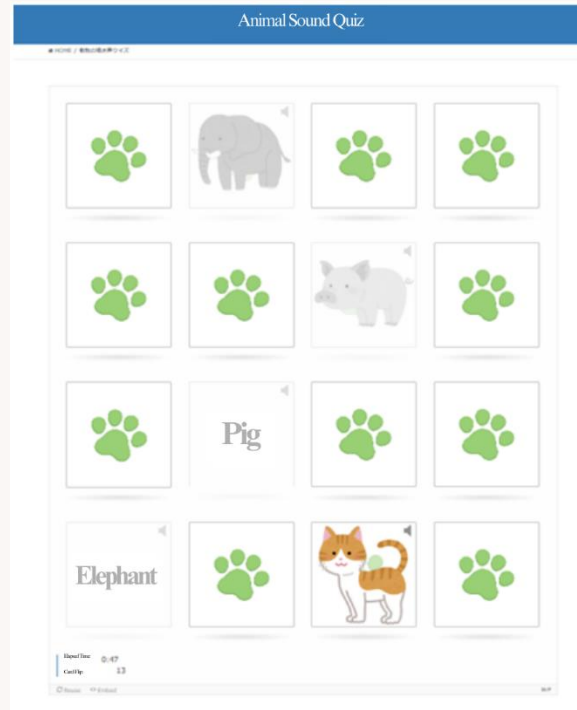

Figure 3：Animal Name Matching Game

H5P offers a content type called "Virtual Tour (360)", which allows users to create interactive tours using 360-degree panoramic photos taken with a specialized camera. By placing links and text within these photos, it enables the creation of an interactive virtual experience. While other authoring tools exist for creating interactive content with panoramic photos, they often require advanced technical expertise, making them less accessible for in-house development. However, with the Virtual Tour (360) content type, creating such content is straightforward. Users only need to prepare the photo files and sequentially specify the links on the web interface. This tool makes it possible to produce regionally focused, original learning materials, using landmarks, historic sites, or even common facilities as subjects. It also encourages spatial learning, where learners can explore and make new discoveries as they navigate through the virtual environment.

Daruma-chan Route

Karasu's Bakery Route
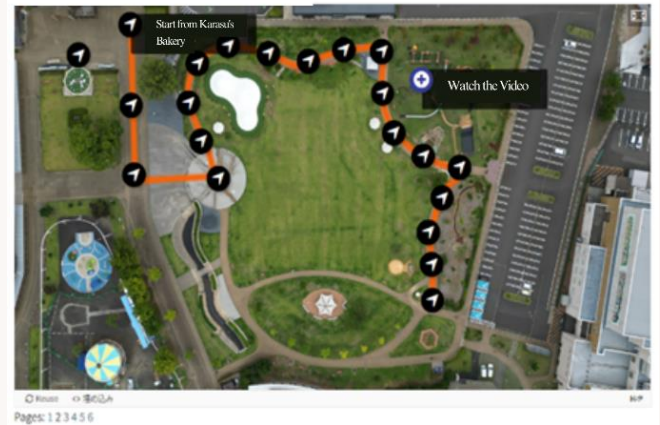

Figure 4: A Scene from the Tour

Figure 5: Tour Map

Figures 4 and 5 show a virtual tour created for Daruma-chan Square in Echizen City, Fukui Prefecture, using the "Virtual Tour" feature. The square features various objects inspired by the picture books of Satoshi Kako. In Figure 4, users can drag within the screen to view a full 360-degree panorama from their current position. Additionally, clicking on arrow icons allows users to move to different locations.

In Figure 5, users can press the plus button to watch videos introducing the playground equipment.

Future Directions for Learning Materials

Generative AI has made it easier to create text and images tailored to specific themes. In the future, it may also facilitate the creation of interactive content and well-designed questions. However, constructing learning materials that engage learners and promote deep understanding requires thoughtful instructional design. New materials that complement existing resources may also be necessary. Developing open platforms for sharing educational content and templates could support diverse learners in various ways. Building systems to provide personalized learning experiences is essential for fostering learner-centered education. Integrating technology and education will play a crucial role in achieving this goal.

References
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Websites Featuring the Content

H5P-Based Elementary School Teaching Materials:

https://h5p.jp/course/view.php?id=8

Ko-To-Ba Club: http://ko-to-ba.club/

Echizen Picture Book Plaza: https://ehonhiroba.site/