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Invited Papers

Designing Culturally Responsive Teaching With Technology

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Abstract

An extensive body of research has indicated that learning environments and materials need to take into account learner backgrounds and differences for best results. One helpful approach to incorporating learner backgrounds into instruction is "culturally responsive teaching." Culturally responsive teaching makes learner needs and identity central to classroom material and activities. Universal Design for Learning (UDL) (CAST, 2018; Burgstahler, 2021) is another useful element. Designing with learners' cultural, physical, and intellectual differences in mind before the class starts, not just adapting while teaching, is quite effective. Technology fits into both culturally-responsive teaching and UDL. Appropriate use of technology enables differentiated learning in a variety of ways. Technology tools, chosen thoughtfully, can also help teachers design inclusive, culturally responsive teaching with technology and better, more meaningful learning for students.

Keywords: culturally-responsive teaching, universal design for learning, differentiation, curriculum, technology

Teachers want the best for their learners. An extensive body of research has indicated that learning environments and materials need to take into account learner backgrounds and differences for best results. Thoughtful and appropriate use of technology also enables differentiated learning in a variety of ways and leads to good outcomes. One helpful approach to incorporating learner backgrounds into instruction, discussed here, is "culturally responsive

teaching." Culturally responsive teaching makes learner needs and identity central to classroom material and activities. According to Gay (2002),

> Culturally responsive teaching is defined as using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively. It is based on the assumption that when academic knowledge and skills are situated within the lived experiences and frames of reference of students, they are more personally meaningful, have higher interest appeal, and are learned more easily and thoroughly (Gay, 2002, p. 106).

What this means is that learning is more memorable when students feel people who look like them, with their backgrounds and life experiences, are included at least some of the time in what learners are doing in the classroom.

Technology use, the other theme of this article, encompasses a great deal in teaching. Word-processors, interactive websites, social media, learning management systems, virtual and augmented reality, artificial intelligence, and more fall into this category. Teachers are pressed to know their learners, design effective environments for learning, provide formative and summative assessment, encourage learners to create digitally, and of course meet learning objectives in their curriculum. With Universal Design for Learning (CAST, 2018; Burgstahler, 2021), teachers, curriculum designers, and technology specialists can be proactive in designing learning environments to meet the needs of all learners. Stapleton-Corcoran (2022, What section) provides a definition:

> Universal Design for Learning (UDL) is an educational framework for creating learning environments that address the diverse needs of learners. At its core, UDL provides students flexibility in the ways they access and engage with course materials and demonstrate mastery of learning objectives.

Designing with learners' cultural, physical, and intellectual differences in mind before the class starts, not just adapting while teaching, is the most effective approach. Even though teachers are often not included in curriculum decisions, teachers can examine the curriculum that they are given for options to be more inclusive and find ways to plan ahead. Technology tools, chosen thoughtfully, can also help add culturally responsive universal design elements.

Technology can add the flexibility and choice called for in UDL in a variety of ways. (The reference and resource list at the end provides some specific examples.) Multiple modes of learning can come through various media. Learners can be writing, recording on a phone, listening, and more. Including audio with text and text with graphics and audio/video help a variety of learners, including our multilingual language learners (MLLs).[1]

Different learners are ready at different times, so offering multiple places to start and multiple modes helps everyone. Teachers found during lockdown that having recorded lectures allowed all learners to go back and review what they didn't understand. With closed captioning, video became reading and listening, offering multiple modes and channels for learning. Different learners prefer different media, and teachers can let them build from their strengths whenever possible. Pace is a similar consideration. Some learners can go faster, and teachers should encourage them by giving them more to do. Others need more scaffolding to get to the same place. Well-designed learning management systems help teachers track where learners are, as well as offering learners access to additional resources for enrichment and support.

Alternative assessment lets teachers have a better idea of what learners can actually do. It can and should be included systematically as part of design. A wide variety of alternative assessments are available; the choice needs to fit the learning objectives and then allow learners to reflect their own contexts. Here are a few examples. A portfolio lets learners highlight what they do well and see progress over time. All ages and levels can use portfolios,

and they can be digital or physical. Digital portfolios are more flexible in many ways, as long as there is adequate technical support. Self record-keeping and reflection (which can be part of portfolios or separate from them) work well for tweens, teens, and adults. They can think about their own work and be responsible for recording it.

Peer assessment can be done by all ages and levels, but it will look quite different, depending on the context. Young learners can talk about whether they liked someone else's work. Older learners can use a rubric to give a more detailed assessment. The whole class is involved, as in Figure 1, with learners looking and talking. Peer assessment goes both ways; teachers assess the peer giving the assessment as well as the student that the peer is assessing. Peer interview is a way for the teacher to observe two (or three) learners and how they interact. Having a rubric in hand in paper or digital form lets teachers track and assess easily.

Figure 1

Students Doing Peer Assessment

Many alternative assessments are performance-based. For teens and adults, performance can include concept mapping, writing (summary, report, blog, social media, comics), presentations, video-making, role-plays, and project-based assignments such as WebQuests. With young learners, performance is more likely to include identifying, drawing or painting,

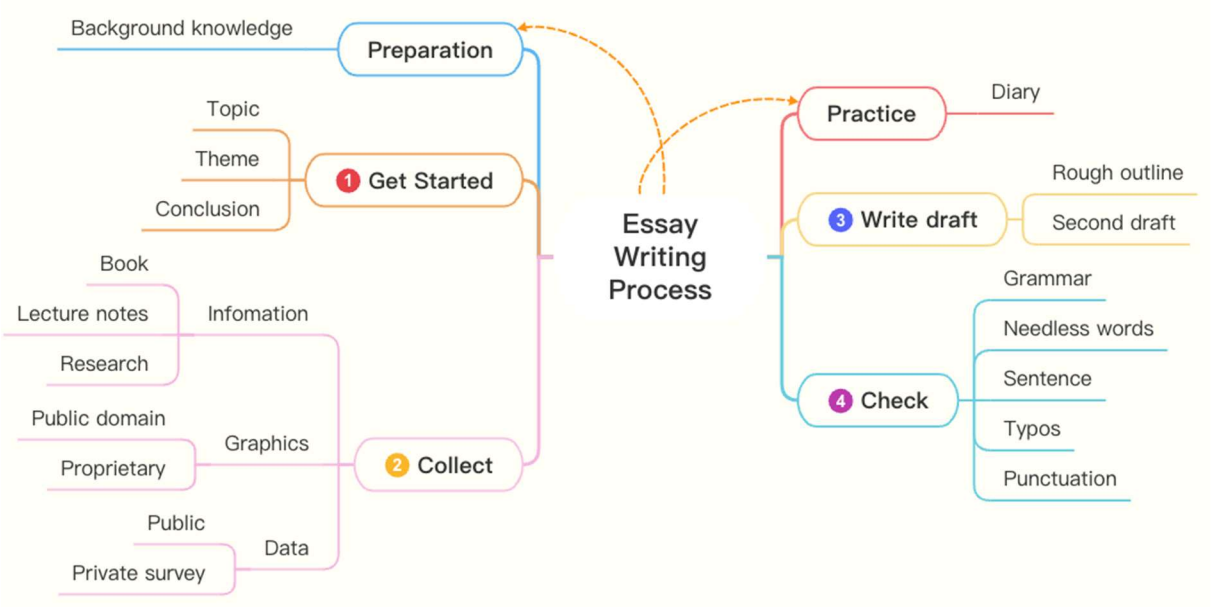
movement such as dancing and singing, role-playing, creative writing (stories and comics), and short reports. The objects that learners produce can be added to their portfolios as well.

Culturally-responsive teaching starts with whether the assessments fit the learning objectives and reflect learners' contexts. Teachers should be considering how to allow learners to bring their own interests and contexts into what they are asked to do. The projects and presentations can showcase learners' homes, families, cultural background, and the like. When young learners are identifying, drawing, doing role plays, etc., they should be working with images, songs, and more that reflect them.

To offer a few specific tech-focused examples, one type of performance-based assessment is a concept map. This is a sample template from GitMind, which offers a number of concept mapping templates (Figure 2).

Figure 2

Concept map from GitMind: Essay Writing Process template



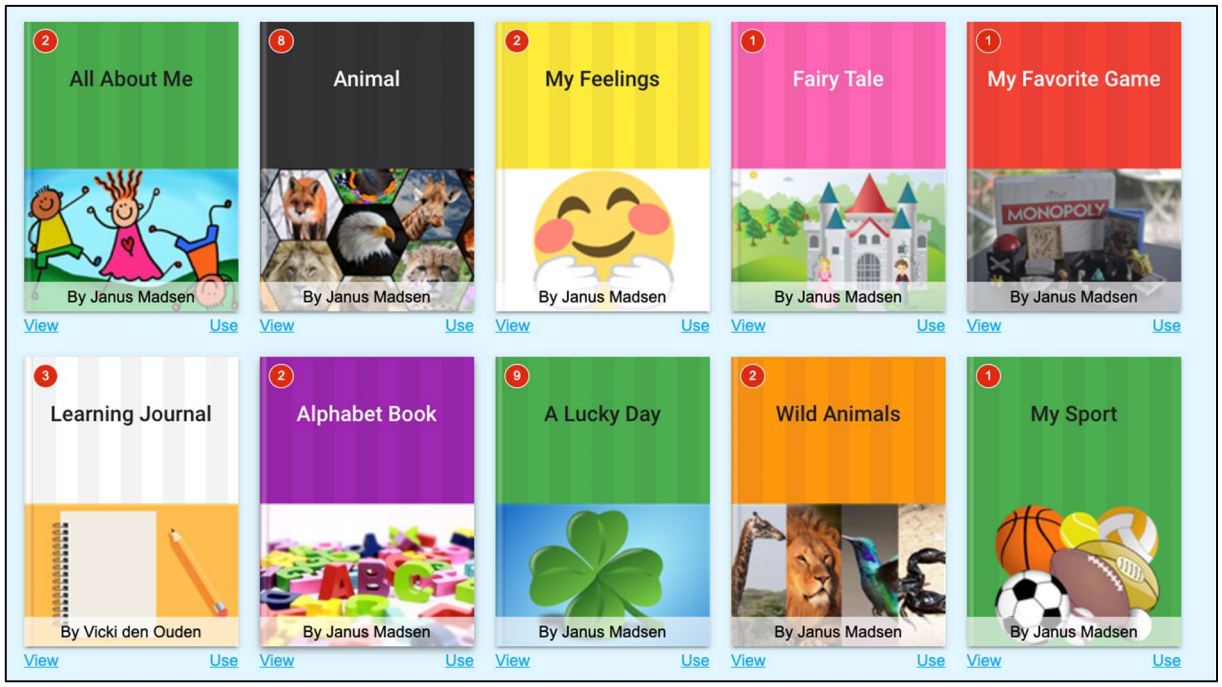
Learners can use paper templates or just draw their own. Digital tools can be more helpful with intermediate and advanced learners or those who like digital tools. GitMind, Miro, and Bubbl.us are just a few of the many digital concept mapping tools that can let learners

demonstrate their vocabulary, content knowledge, and grammar. With any of these, group work can be used to demonstrate collaboration.

An interesting story creator geared toward young learners is WriteReader. This is a very simple, easy-to-use way to create a book with photos and recorded audio. It includes both free and paid versions. Figure 3 shows several templates: All about me, Animal, My feelings, Fairy tales, My favorite game, Learning journal, A lucky day, School year memories, My sport, Wild animals, Alphabet book, and My learning.

Figure 3

WriteReader Templates



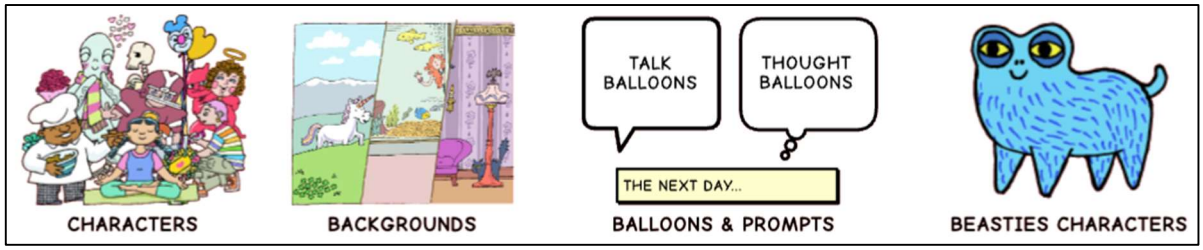
The class could do much the same thing with Word or Google Docs, but this makes it look more like a book when the learner is finished, and learners can share with classmates and family easily.

Young learners, teens, and adults can all enjoy creating comics. Again, this can be done by hand, but young learners and those with less artistic ability may benefit from good-looking ready-made graphics. Learners supply the language in the form of text in bubbles or as

captions. Working with a partner also encourages language production as learners negotiate decision-making. One example of a comic strip creator is Make Beliefs Comix (see Figure 4). Learners choose from the images in the app for the background, characters, and different props, but they can arrange the characters and props in different ways, and then add their own speech bubbles to create the story. Learners can't create their own graphics, which limits how representative this can be, but there are quite a few choices.

Figure 4

Some Elements in Make Beliefs Comix



In addition to people with a variety of ethnicities and costumes, learners can choose animal or creature characters (Figure 5).

Figure 5

Sample Characters From Make Beliefs Comix

Producing comics is a very fun approach to writing, and it allows learners to express themselves creatively. Tasks can be chosen to encourage learners to write about themselves and their own backgrounds.

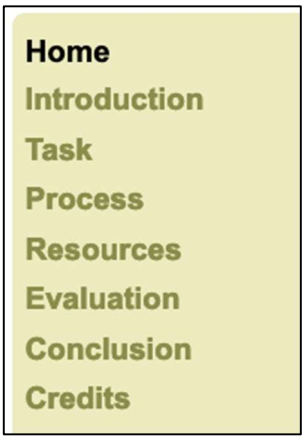
WebQuests are a way of organizing project-based learning. A WebQuest doesn't need to be online; this can be an organizing scheme, with the elements printed out. In the Figure 6

template, the elements are home, introduction, task, process, resources, evaluation, conclusion, credits, and sitemap. Each element has its own page:

- The Task page includes a description by the teacher of what learners are expected to do and the project they are working on. The end result should be something tangible.
- On the Process page, the teacher describes how the work is to be done, such as the role of each team member and the process, step by step. More linguistically advanced or older learners can help set roles themselves for their team.
- The Resources page generally includes at least some resources/links provided by the teacher. Lower-proficiency learners should find almost all that they need here rather than trying to do a web search on their own.
- The Evaluation should be clearly explained from the beginning. Project-based learning often has one or more rubrics to use in evaluating different elements of the projects. Teamwork may be one assessment; the final project(s) would have other rubrics.

Figure 6

WebQuest Elements



Project-based learning appeals in particular to students who want to do something useful and make a difference. Learners collaborate to produce a tangible product that goes outside the classroom, often in multimedia form. Using project-based learning takes some planning and allows teachers to consider learner strengths and where they need more support.

Learners can do a project relevant to them and their community. This is wonderful for both universal design for learning and culturally responsive teaching.

This article has been a brief overview of the ways that culturally responsive teaching and universal design for learning help teachers create inclusive, vibrant classrooms where learners can see themselves in the material and activities. With universal design for learning, teachers can plan ahead and use technology in the most appropriate way. The result is better, more meaningful learning for students.

For more information, explore CAST's UDL Guidelines (2018). Each element is described in detail: how to provide multiple means of engagement to produce learners who are purposeful and motivated; how to provide multiple means of representation, to produce learners who are resourceful and knowledgeable; and how to provide multiple means of action and expression, to produce learners who are strategic and goal-directed. Additional helpful ideas and resources are on the CAST website, which is in the reference and resources list below.

Footnotes

1. I use multilingual language learners or MLLs in this paper to be as inclusive as possible. MLLs include those learning English as an additional language inside or outside an English-speaking environment. They are learning English for their own varied purposes with the goal of adding to their linguistic repertoire.

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West Virginia Department of Education. (n.d.). 7. *UDL guidelines checklist.* https://wvde.state.wv.us/osp/UDL/7.%20UDL%20Guidelines%20Checklist.pdf

Technology tools

General

- Google. (n.d.). Accessibility: Products and features. https://www.google.com/accessibility/products-features/ - extensive list of accessibility features within Google products.
- Microsoft.com. (n.d.) Accessibility products. https://www.microsoft.com/en-us/accessibility/ - accessibility features within Microsoft products.
- Road to Grammar (n.d.). Text analyzer. http://www.roadtogrammar.com/textanalysis/ - free tool that determines the CEFR level of text.
- WebAIM. (n.d.). WAVE web accessibility evaluation tool. https://wave.webaim.org/ - checks web pages for accessibility.

E-portfolios

- WordPress – https://www.wpexplorer.com/online-portfolio-wordpress/ and video at https://youtu.be/ne5Obuwg7oM for help

- Google Sites with Google Drive –how-to explanation at https://www.uwb.edu/it/training-and-support/teaching-learning/eportfolios/new-google-sites; helpful video at https://www.youtube.com/watch?v=EX7EfkcXyAQ
- Moodle or Blackboard component – ask your administrator

Concept maps (mind mapping, constellations)

- GitMind - https://gitmind.com/ - free registration for access to downloaded, mobile, and online app; more education examples and templates than many others listed here
- Canva – https://www.canva.com – many templates, including concept maps; powerful and complex app; free registration
- Bubbl.us – https://bubbl.us – three concept maps for free. Relatively easy to use.
- Templates from Template Hub - https://www.templatehub.org/concept-map-templates-6870.html - variety of concept map templates free to download

Blogs

- Blogger – https://www.blogger.com – easy to use, free blog site; part of Google
- Edublogs - https://edublogs.org/ - free; designed for educational use. No ads.
- WordPress – https://www.wordpress.com - website creator includes blogs; free basic site

Story/book and Comic Creation for Learners

- MakeBeliefsComix – https://makebeliefscomix.com – free comic strip creator (up to 18 cells); register to save. Free to print.
- Storyjumper – https://www.storyjumper.com – free to create an online book; pay to turn it into PDF or print it.
- WriteReader – https://app.writereader.com – free basic app; register to use

Video Tools

- Flip (formerly Flipgrid) – https://flip.com - free, widely used for remote learning; easy to create a classroom video sharing site (Microsoft product)

- iMovie – https://www.apple.com/imovie/ - available for Apple's iOS; works well on iPad
- Microsoft Photos – part of Windows 10 and later; creates movies. Windows 8 and earlier can use MovieMaker; MovieMaker does not work on later versions.
- Screencast-o-matic – https://screencast-o-matic.com – screen recorder; 15 minutes for free or get a paid plan for longer recordings.

WebQuest Tools

- Google Doc Webquest Template: https://docs.google.com/document/d/1tIVITnkuSfl0JYzj9SZXkMM3Rk5Jj108JMiHC5eFzgw - helpful, step-by-step approach
- QuestGarden: http://questgarden.com/ - search for examples (free search); subscription-based to create webquests on their site
- WebQuest.org: http://webquest.org/ - the original site
- Zunal.com: https://zunal.com - you can make a few webquests there for free

Rubrics

- Rubistar: http://rubistar.4teachers.org/ - free rubric templates with suggested descriptors

Towards Data and Evidence-driven Education in the Context of Language Teaching and Learning

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Huiyong Li

Rwitajit Majumdar

Yuko Toyokawa

Kensuke Takii

Changhao Liang

Kyoto University

Abstract

Language teaching has a rich research history. A research discipline of Computer-Assisted Language Learning (CALL) has focused on technology integration in that practice. However, integrating the learning logs to create a data-driven workflow for the teachers and students is still limited. We design a technology framework called LEAF (Learning and Evidence Analytics Framework) to integrate daily evidence-based educational practices. The data-driven learning tools integrated into LEAF were implemented in actual live classrooms across multiple universities and schools within Japan. In this paper, we discussed the teaching and learning practices with the LEAF system in a language learning context and its impact. We highlight how to use LEAF for active reading, recommendation-based vocabulary learning, self-directed language learning approaches, and group work for language learning and teaching, specifically in English classes. Moving ahead, we aim to have an evidence-driven approach where the technology can continuously support and update best practices by analyzing the log data gathered continuously from the real-world educational setting.

Keywords: LEAF, data-driven service, evidence-driven education, language learning

Nowadays, there is a rapid adoption of educational technology to enhance teaching and learning in regular educational settings and emergency remote learning due to the COVID-19 pandemic. Many countries and institutions already had resourced infrastructures to speed up the transformation from the conventional educational approach to technology-enhanced educational innovation. For instance, in Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) introduced the Global and Innovation Gateway for All (GIGA) School Program to transform learning using an ICT environment and one device per student (MEXT, 2020). The program rolled out nearly 461 billion Japanese Yen over the fiscal year of 2020 and 2021 to build the capacity. Across the globe, many countries have taken the e-learning infrastructure to the next level to integrate learning analytics to inform and support their stakeholder's decision-making. Some studies report those implementations in the educational context of the United States (e.g., Krumm et al., 2018), Spain (e.g., Martínez Monés et al., 2020), Bulgaria (e.g., Gaftandzhieva et al., 2021), and Uruguay recently (Queiroga et al., 2022). Globally it is seen that e-learning infrastructure is necessary, however, not a sufficient condition for effective teaching-learning at an institution level and nationwide level.

Generally, e-learning infrastructure across various institutions often includes a Learning Management System (LMS), various ubiquitous classroom learning tools, Learning Record Stores (LRS), and Learning Analytics Dashboards (LAD). Such an infrastructure can apply Learning Analytics (LA) methods to process log data and support various stakeholders. Teachers can refine their instructional practices, learners can enhance learning experiences and researchers can study the dynamics of the teaching-learning process with it. While LA platforms gather and analyze the data, there is a lack of a specific framework to capture the technology-enhanced teaching-learning practices and promote evidence-driven education across different institutions and countries.

This paper focuses the research agenda on evidence in a data-driven educational scenario. We propose the Learning Evidence Analytics Framework (LEAF) and present the research challenges. Four data-driven services with LEAF are introduced for language teaching and learning. Moving ahead, we aim to have an evidence-driven approach where the technology can continuously support and update best practices by analyzing the log data in near real-time.

Learning and Evidence Analytics Framework (LEAF): An Infrastructure for Data-driven Education

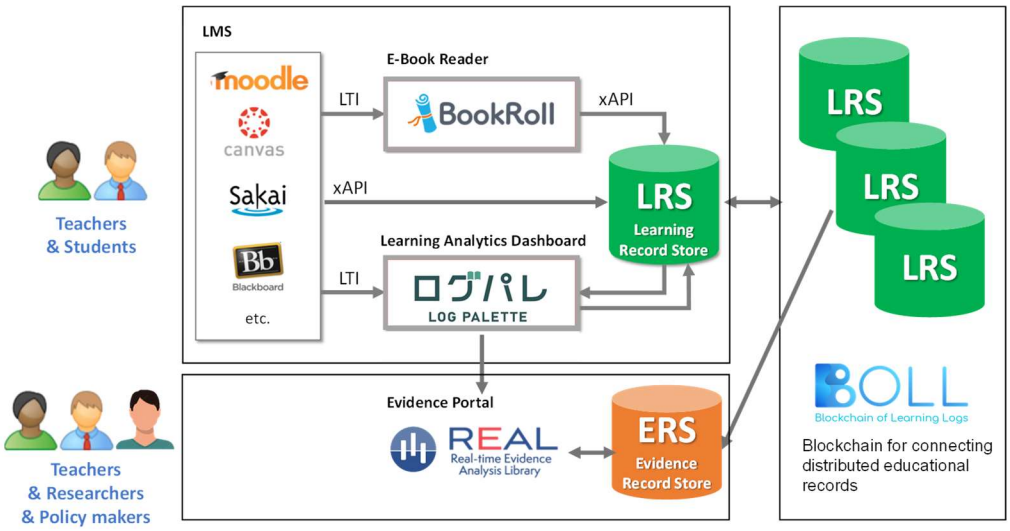
LEAF is the overall technical framework that seamlessly integrates research and production systems to enable educational data science research as well as AI-driven services for the users (Ogata et al., 2018, 2022, in press). The stakeholders include the institutes' students, teachers, researchers, and course coordinators. This paper presents the components of LEAF and illustrates some of the teaching-learning practices that the framework supports toward data and evidence-driven language education. Figure 1 shows the various components of the framework.

A Learning Management System (LMS) is an online system that provides an environment to structure courses and maintains user roles such as teachers, students, and course administrators to grant access to different course materials and activities shared in LMS. Moodle or Sakai are examples of such LMS that are already common at various educational institutes in Japan and abroad. LEAF integrates various e-learning tools with LMS using standardized Learning Tools Interoperability (LTI) protocol for a seamless authentication transition from an existing LMS in an institution using an anonymized unique ID. For instance, BookRoll (Ogata et al., 2015) is an E-book reader that records users reading and annotation behaviors. The interactions are logged using Experience API (xAPI), which is an open-source statement API for outputting anonymized event logs to a centralized

independent Learning Record Store (LRS). The data-driven services are built based on these learning logs.

Figure 1

Learning and Evidence Analytics Framework (LEAF) and Its Components

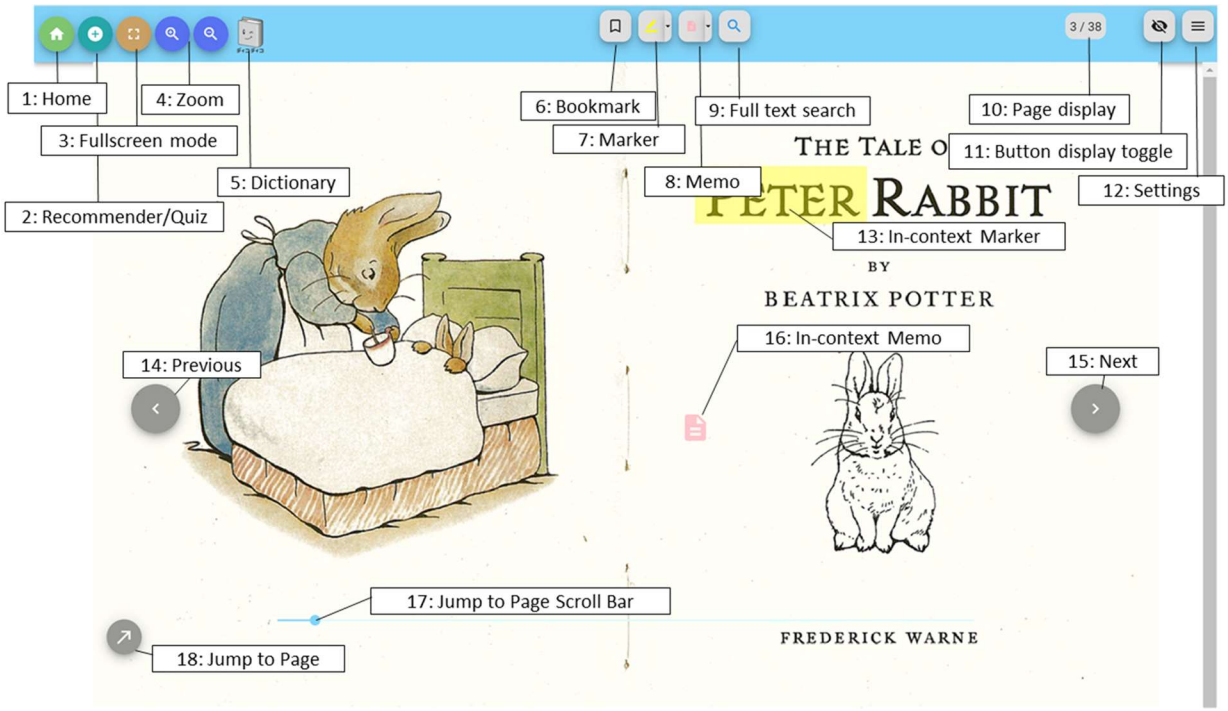


BookRoll serves as a learning material distribution platform and captures the reading interaction logs used for students' LA in content and behavior. Teachers can upload learning materials to BookRoll in PDF format, while students can access them from a wide range of devices through a standard web browser. Figure 2 presents the user interface of the BookRoll E-book reader. BookRoll tracks reading interactions such as navigating the reading content (going to the next or previous page, or jumping to different pages) and annotating parts of the learning materials that are hard to understand or important with memo comments, bookmarks, and markers. Other features of BookRoll include a smart dictionary that allows readers to look up the meaning of any highlighted word and can be used for vocabulary learning activities. A hand-written memo function allows users to make strokes using a digital pen or a touch-enabled mobile device directly. A recommender and quiz panel allows the recommendation

engine to share the link to external resources and lets teachers create a reflective quiz for formative evaluation.

Figure 2

User Interface of BookRoll E-Book Reader

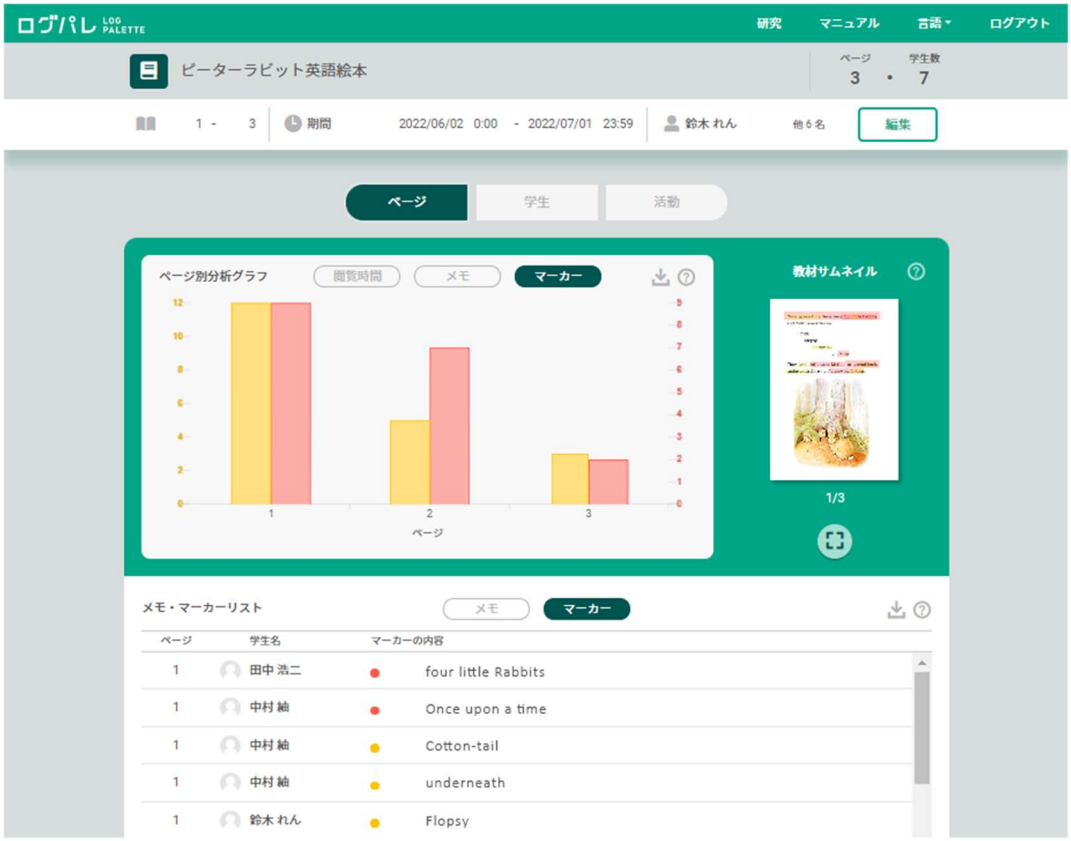


Log Palette is a learning analytics dashboard in LEAF, as shown in Figure 3 (Ogata et al., 2022). Log Palette analyzes the trace log in BookRoll via LRS and visualizes the results in the dashboard in near real-time. As with BookRoll, Log Pallet can be added as an external tool to an LMS by LTI protocol. LTI protocol automatically handles the user roles and displays different panels of graphs with customizable views for teachers and students. The analysis results about learning material, individual engagement, and group engagement are displayed in three graphical panels in the dashboard. Firstly, a *Page* panel provides summarized and detailed information regarding learners' frequency of learning trace and a list of learning content from memos or maker annotations by pages as shown in Figure 3. Secondly, a *Student* panel gives individual statistics regarding learning engagement in the

selected learning material, such as achievement rates of reading, reading time, interaction frequency, markers and memos count. Thirdly, an *Activity* panel provides aggregated statistics about group engagement in the selected learning material. In this panel, both teachers and students can see the average statistics of learning engagement in the selected material and learning performance in the quiz and compare them with the selected student.

Figure 3

User Interface of Log Palette Learning Analytics Dashboard



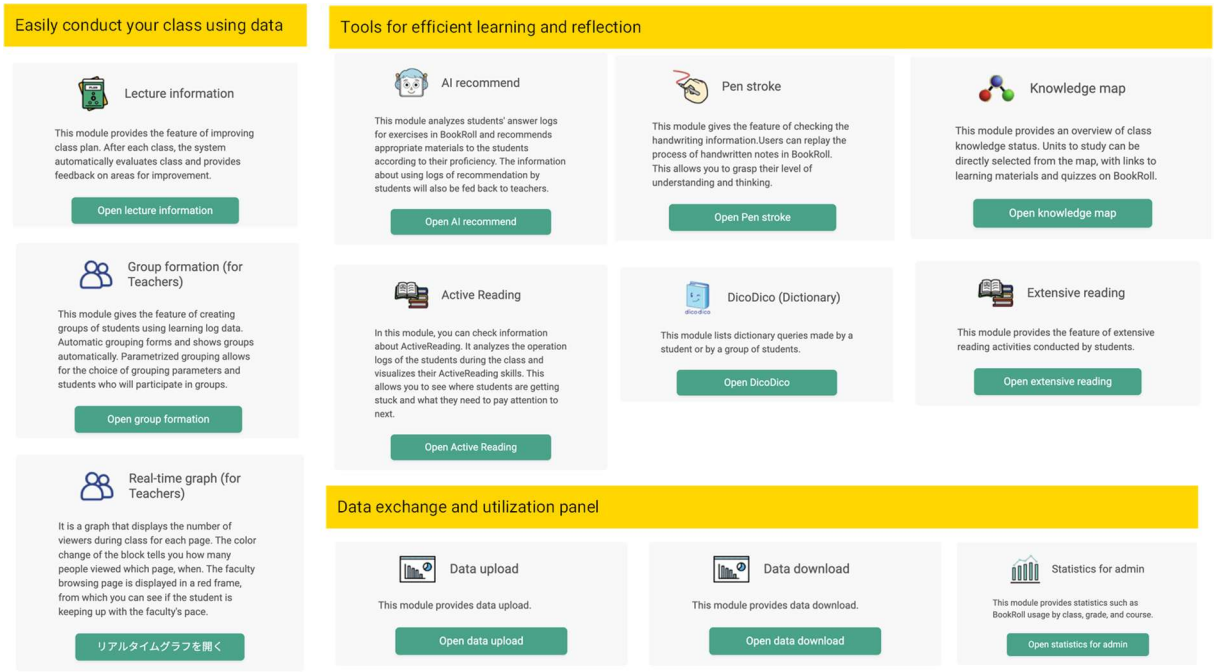
Advanced data-driven tools and micro-services are linked in the Log Palette dashboard in Figure 4. The tools and micro-services enable teachers and students to integrate other data beyond BookRoll reading logs, such as uploading offline test scores, their perception survey responses, and so forth. The tools and micro-services can utilize reading and other data to create an open learner model in LEAF. They can broadly be grouped into three categories:

tools to conduct classroom activities using trace data easily, tools for efficient learning and reflecting on learning, tools for data exchange and utilization monitoring. For instance, a group formation tool linked to LEAF uses the learner model to form heterogenous or homogenous groups for collaborative work (Liang, Majumdar, & Ogata, 2021). Also, the data about content interaction and performance on a specific topic can be used to create knowledge maps of a particular topic of a cohort of learners (Flanagan et al., 2021).

Thus, BookRoll and Log Palette prepare the foundation for collecting, analyzing and sharing learning logs to support teachers and students in their daily teaching and learning context.

Figure 4

Advanced Data-driven Tools Linked in Log Palette



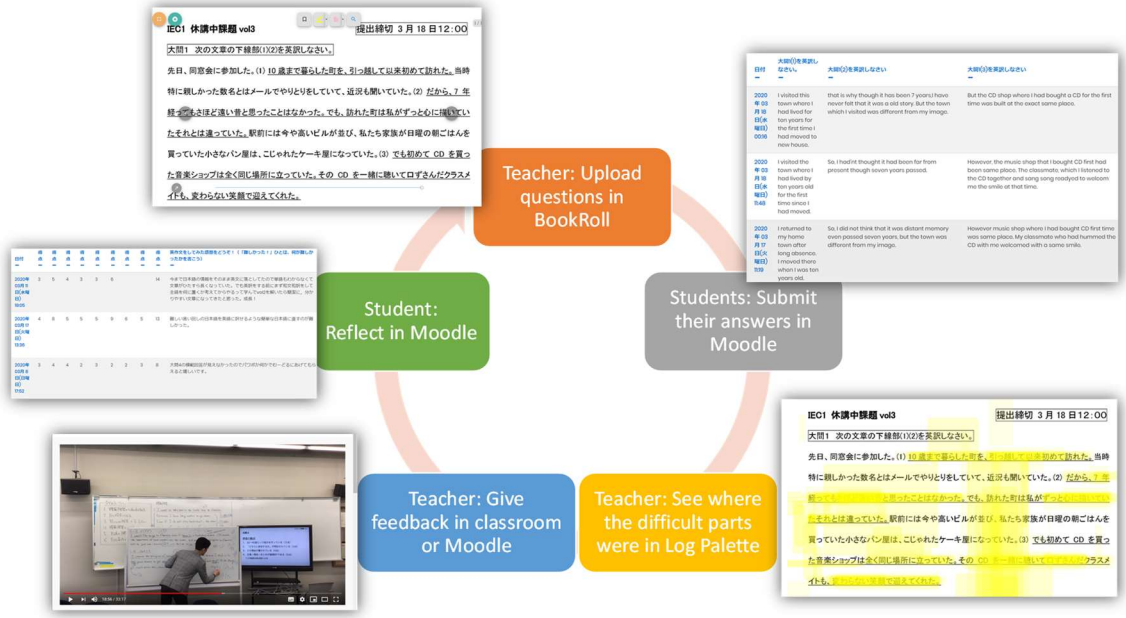
Learning Analytics Cycle With LEAF for Language Teaching and Learning

The LEAF infrastructure is designed and developed to enrich teaching-learning interactions with various data-driven tools and services. It can be utilized by teachers from

different subject domains to promote the engagement between teachers, students and learning contents and improve teaching and students' learning in an offline, online, or flipped mode. A typical learning analytics cycle is shown for language teaching and learning using the LEAF system (see Figure 5). Importantly, such a LA cycle can be adopted flexibly by teachers to orchestrate classes in a face-to-face mode (Chen et al., 2022), online mode (Yang et al., 2022), flipped mode (Toyokawa et al., 2021a) or during remote teaching due to the COVID-19 pandemic (Majumdar, Flanagan, & Ogata, 2021).

Figure 5

Advanced Data-driven Tools Linked in Log Palette



Facilitating Language Teaching and Learning Using Data-driven Tools in LEAF

Given the various data-driven tools in the LEAF infrastructure, we will demonstrate the capabilities of those LEAF services to facilitate teaching-learning activities, especially in the context of language teaching and learning in Japan. Four data-driven tools and their empirical studies in English teaching and learning class will be introduced: digitally enhanced active

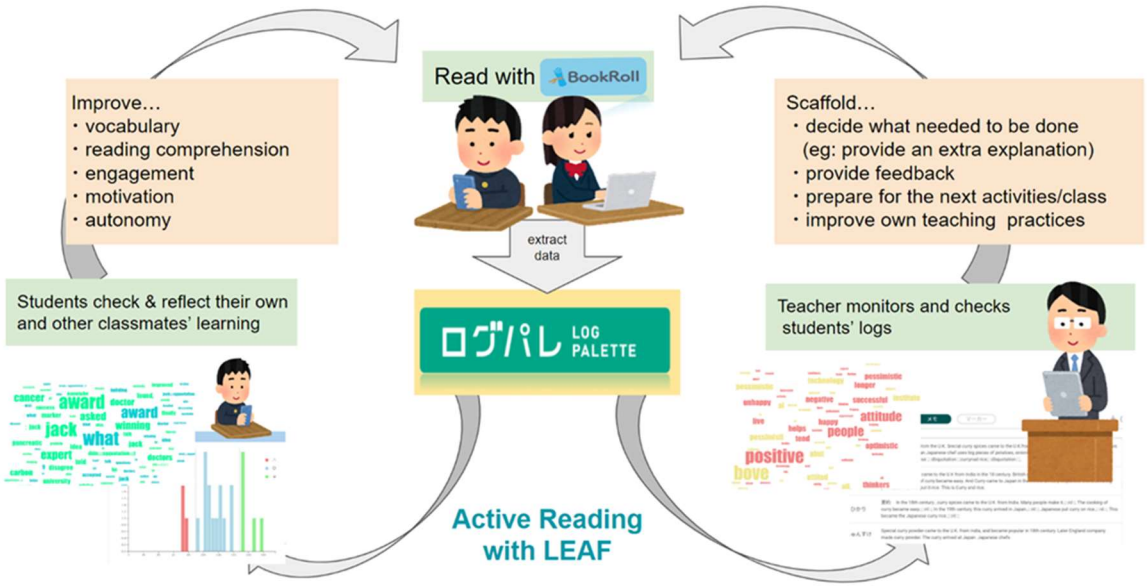
reading, online self-directed extensive reading, AI recommendation for language learning, and reading-based online group work.

Digitally Enhanced Active Reading With LEAF

Introducing appropriate reading strategies would assist students in acquiring reading skills, improve reading comprehension, and eventually lead to their motivation and autonomy toward reading. Active Reading (AR) is a strategy that can foster and develop learners' reading performance and skills. It activates the reader's prior knowledge and experience gained in the past and relates them to new information to facilitate understanding of the content of the written text (Ogle, 1986; Spivery, 1987). One well-known strategy is SQ4R (Survey, Question, Read, Record, Recite, and Review) (Khusniyah & Lustyantie, 2017). We could digitally enhance SQ4R using the affordance of the LEAF system, enabling students to perform AR individually and cooperatively during group work. It is orchestrated as follows: predicting the content by skimming and scanning through such as the title and pictures in the text (Survey), asking questions to self about the content (Question), highlighting unknown words and main ideas, leaving annotations and questions in a memo (Question and Record), confirming their understanding with discussing with peers or in a group (Recite), and writing a summary of the story and working on extra review activities (Review). Further, in order to further strengthen reading skills, comprehension, and learners' independence, it is necessary to give learners an opportunity to reflect on their learning and lead to the next step. The Active Reading Dashboard (AR-D) in Log Palette presents a visualization of the reading behaviors of learners for them and the facilitator to reflect on. Figure 6 shows an overview of the digitally-enhanced AR workflow using the LEAF system components. Teachers can decide on individual or group AR sessions in academic reading classes as ones often conducted in the higher education level. With LEAF, such sessions can be more self-directed by the students, and teachers can evaluate effectiveness using the reading behavior data that is logged.

Figure 6

The Flow of Digitally-enhanced Active Reading With LEAF



Since 2020 we have conducted several AR experiments using LEAF to investigate the effects of improving learners' reading comprehension and scaffolding teachers' teaching practice. These AR strategies were implemented across learning contexts of individual and group levels, face-to-face and online and in self-directed learning sessions. In this chapter, we shall introduce two studies: Jigsaw AR (Toyokawa et al., 2021b), a collaborative learning study conducted in a public high school during their English class, and Flipped online AR (Toyokawa et al., 2021a), an individual activity conducted as part of a university reading course.

Jigsaw AR: In Class Cooperative AR Activity With LEAF

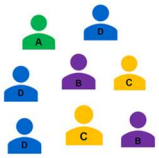
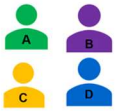
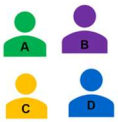
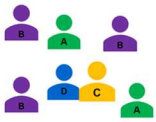
The effects of AR with LEAF in English classes have mainly been measured with the integration of AR class with collaborative group learning. An example is an integrated AR with Jigsaw group learning. Through jigsaw activities, students work on their part of a subject, cooperatively assemble the parts to fill in missing information, and complete the tasks

together (Aronson, 1978). The existing jigsaw methods neither explored much technology affordances to conduct the activity nor its effectiveness has not been verified by using log data while using the technology platform. Most of the preparation, activities, tests, and evaluations manually invest teachers' time and effort. Therefore, we proposed JigsawAR as a new version of jigsaw learning which incorporates AR strategies and is modified to the current form to orchestrate the class activities using LEAF. Using the logged data further provides opportunities to utilize it for teaching activities and evaluate effectiveness.

Participants of the Jigsaw AR were high school students who belonged to the Integrated English Competency (IEC) classes in Japan. There are two levels for the classes: standard and advanced, whose classes were divided based on their previous academic records. Jigsaw AR activities were conducted over two days. The students were divided into groups on the first day and conducted their individual reading portion in the pre-jigsaw phase. The next day they conducted the rest of the Jigsaw phases. Each class was 50 minutes long. In total, 62 students were registered in the course (advanced = 36 and standard = 26). Figure 7 shows the Jigsaw AR procedure as an example used for individual and group reading activities using BookRoll.

Figure 7

Jigsaw Active Reading With LEAF

Jigsaw AR Phases	Pre-reading activity	Jigsaw pre-activity	Jigsaw expert activity	Jigsaw activity	Review & Evaluation
	 Individual 10 mins.	 Home group 10 mins.	 Expert group 20-30 mins.	 Home group 20-30 mins.	 Home group or individual
Active Reading tasks	Prediction / Question	Read / Record	Read / Recite / Record	Read / Recite / Review	Review
Learning tools	Memo in BookRoll	Markers, memo, and DicoDico in BookRoll	Memo in BookRoll	Memo in BookRoll	(Peer / Group evaluation)

Facilitating Reading Skills and Learning Engagement Through Jigsaw AR

As for Jigsaw AR using LEAF, first, Jigsaw groups were formed using a group formation system based on the logs of students' pre-quiz scores, and vocabulary quizzes were made based on the logs from marker use and DicoDico dictionary use in BooRoll.

Through Jigsaw AR, students could work individually and with their peers in a group to understand the contents of the reading and assemble the flow of the story together. As a result, the vocabulary quiz scores improved significantly from pre to post-quiz ($p < .001$). Differences in annotation behavior among students at different levels were also observed in logs. Based on the findings of the present study, it was concluded that data-driven Jigsaw AR design played a positive role in enhancing English skills in terms of vocabulary and reading comprehension and facilitating students' engagement in English classes.

Flipped Online AR With LEAF

AR using LEAF not only can be applied to individual and group activities in class but also be used for self-regulated reading activities outside of class and online classes. For investigating AR learning outside of class, we conducted AR experiments in flipped learning. University freshmen ($n = 16$) in a basic AR class learned through flipped online AR over a semester, and student learning engagement and the relationship between their grades and their learning attempt were examined. Students were asked to conduct a reading task as flipped learning using BookRoll. The online-class activities were basically based on what was left in the logs from students' flipped assignment attempts. Students used the dashboards to check their own and their classmates' logs during and outside of class for reflection on learning, and teachers made decisions about the next action based on the logs. The teacher's role for the flipped assignments was to upload quizzes and learning materials on BookRoll, provided feedback to students, and assembled online-class activities based on their assignment

outcomes. For the online classes, the teacher's role was to assist students as a facilitator: encouraging students to participate in activities, facilitating and monitoring breakout-room activities by checking students' engagement with the analysis tool available in near real-time, and dealing with questions from students and visiting each room if needed.

Improving Reading Participation and Comprehension by Incorporating Logs Into AR Activities

From the implementation of online flipped AR with LEAF, it was found that there were relations between freshman English learners' learning achievement and their flipped AR performance. For example, students who got lower scores on pre-quizzes and spent less time on their homework got lower scores on the midterm test. Logs from BookRoll provided students' reading interactions and engagements during the flipped assignments (for example, the maximum length of time spent on BookRoll was 75 minutes per day and the average was 20.56 minutes), and gave the teacher opportunities to decide, conduct and monitor the activities during the synchronous online phase. In digitally enhanced AR research using LEAF, it was found that learning logs can be used to reflect on AR learning, and by incorporating logs into AR activities, learners' reading comprehension and participation levels are improved.

Online Self-Directed Extensive Reading With LEAF

Self-directed learning (SDL) is the basis of lifelong learning and it has been identified as an increasingly important skill in the 21st century (Brockett & Hiemstra, 2018). SDL can be defined as a process in which learners take their own responsibility to direct one's learning to meet personal learning goals (Boyer et al., 2014). SDL requires learners to be active and purposefully harness a number of skills to maximize their learning. There is a greater need for students to develop SDL ability following the shift from teacher-centered traditional classrooms to learner-centered approaches with advanced technologies (Toh & Kirschner,

2020). Extensive reading (ER) is a way of language learning through substantial amounts of reading, chosen and mastered by the learners themselves (Day & Bamford, 1998). ER has been considered in the areas of EFL (English as a Foreign Language) and ESL (English as a Second Language) studies as an effective way to promote learners' language development. ER has positive effects on general foreign language development, including vocabulary acquisition, reading fluency, reading strategies, and writing performance. Despite the potential positive effects of ER, not all learners benefit from its support due to individual differences in SDL ability. SDL ability may influence individual preferences and further affect academic performance. Students highly require Self-Directed Extensive Reading (SDER) skills to persist in reading effectively and efficiently in the online learning environment. Considering that students have significant differences in ER autonomy and SDL ability, it's essential to support students with personalized technology scaffolding to help them engage in SDER.

Goal Oriented Active Learning (GOAL) is a data-driven tool in LEAF to support students' self-directed learning (SDL) (Li, et al., 2021a; Majumdar et al., 2018; Yang et al., 2022). GOAL automatically synchronizes learners reading activity logs that are captured in BookRoll e-book reader and stored in the LRS. Combining the theory of SDL and self-regulated learning, GOAL implements the technology-enhanced SDL cycle from a data-informed perspective into five phases. The initial phase of data collection gives learners the initiative in their learning contexts, followed by the other four phases: data analysis, planning, execution monitoring and reflection. The GOAL tool can not only provide critical indicators in a learning activity such as extensive reading for engaging learners in SDL but also provide computer-based scaffolds that aim to improve learners' SDL ability in five phases.

Figure 8 shows the online SDER support environment with LEAF. It contains four components: a learning management system (LMS) such as Moodle, the BookRoll E-book

reader for ER, the GOAL tool for SDL, and a learning record store (LRS). The LMS provides the entrance of all learning resources and a discussion forum for sharing the learning experience with classmates. Both BookRoll and GOAL can be launched through the LTI protocol from the LMS. More than 500 E-books are provided for students to execute ER in BookRoll. The E-books are from level pre-A1 for beginners to level B2 for upper intermediates of the Common European Framework of Reference for Languages. LRS stores BookRoll learning logs, such as the number of pages they read and the time spent on the activity. GOAL synchronizes BookRoll learning logs from the LRS automatically. The learning logs are aggregated into various learning indicators with hourly, daily, and weekly scales, such as daily reading time spent in ER. Then SDL scaffoldings are implemented and provided to students in five phases (Data collection - Analysis - Planning - Execution monitoring - Reflection).

Figure 8

Online Self-Directed Extensive Reading Support Environment With LEAF

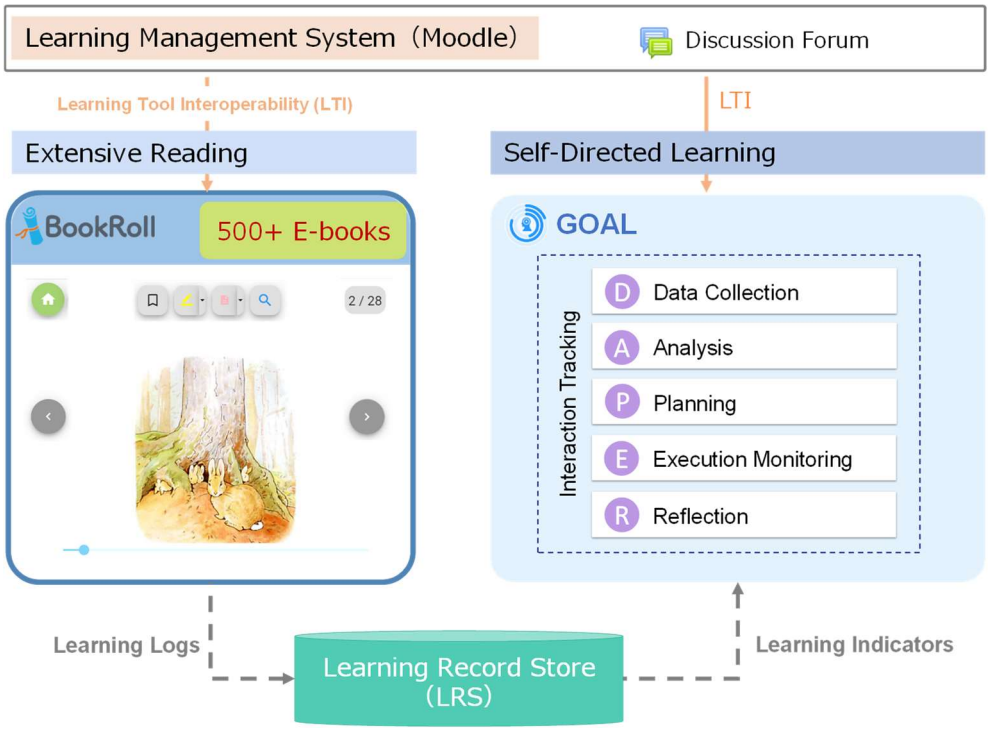
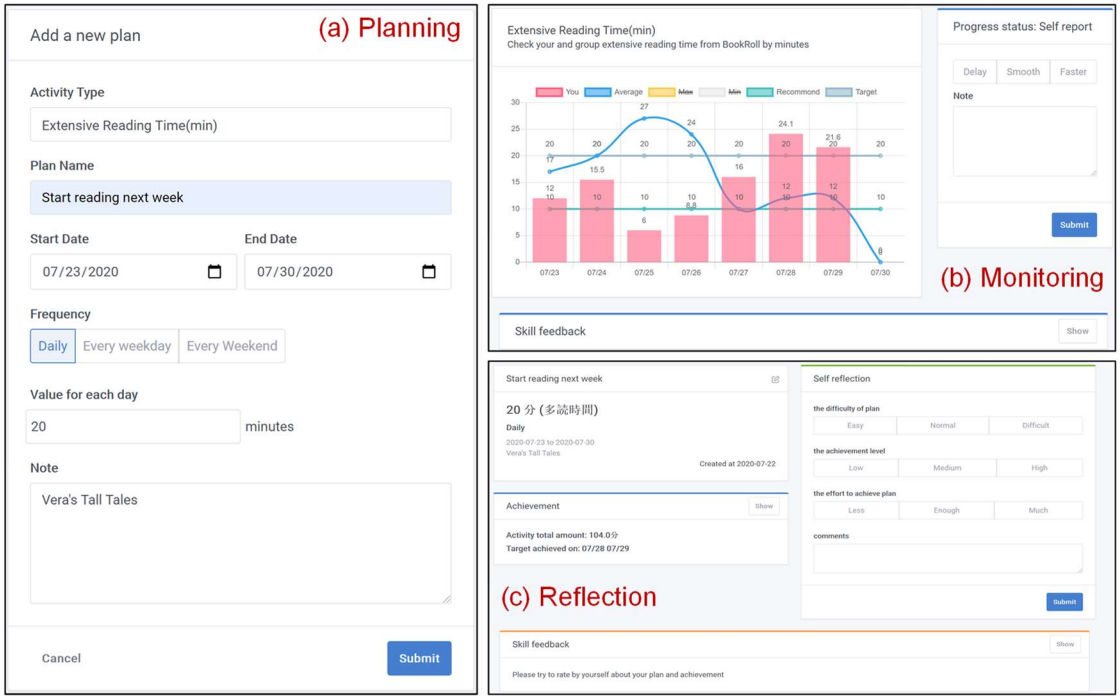


Figure 9 shows GOAL's user interfaces for planning, monitoring, and reflection. The "Planning" panel assists students in creating, editing and deleting their reading plans with a plan template. The plan template includes the activity type, plan name, start date, end date, frequency, value for each day, and notes. The "Monitoring" panel contains a visual graph of reading activity and a self-evaluation form. Learners can track their detailed self-progress and compare them with the average value of the group, recommended value, or target value. They can further evaluate their progress status through self-rating and unstructured note-taking. The "Reflection" panel contains the plan details, achievements, and self-reported reflection journals related to a specific plan. All five panels provide feedback based on the learner's SDL skills, measured by the interactions in each panel.

Figure 9

User Interface of GOAL for (a) Planning, (b) Monitoring and (c) Reflection



Online SDER Support in K-12 Schools in Japan

To evaluate the effects of online SDER support on students' learning, we carried out multiple experiments in a combined public junior high and high school in Japan.

Figure 10

Workflow of Self-Directed Extensive Reading in K-12 Settings

The workflow of SDER in K-12 settings is shown in Figure 10. Firstly, students were introduced to four key principles in the SDER orientation: read easy materials without dictionaries, self-select what they want to read, read as much as possible, and take responsibility to set their own goals. They were also given instructions on how to select appropriate e-books, read e-books online, and manage their reading plans at their own pace in the SDER orientation. Then, students were encouraged to read picture E-books extensively in BookRoll and manage SDL in five phases in GOAL. For instance, students could select a fiction e-book to read or create a personal reading plan with a daily target value in reading pages. They were also suggested to execute the SDER cycle regularly to form good reading habits. More than 1,000 students have used the online SDER support from 2020 to 2022.

Importance of SDL Ability and Online SDER for Language Learning

Regarding the effects of SDL ability, we found that high SDL ability students had significantly more reading engagement, SDL behaviors, motivation and autonomy for extensive reading than those with low SDL ability (Li, et al., 2021a). Further, by applying cluster analysis and transition analysis methods it was possible to differentiate groups of learners with different planning behaviors during a short-term (1-week reading plan) and longer-term (1-month reading plan) (Li, et al., 2021b).

Regarding the effects of online SDER support, we found that the students with SDER support spent more time reading and read more picture books than those without SDER support (Yang et al., 2022). The group with SDER support read an average of 169 minutes and 6953 words, while the group without SDER support read an average of 19 minutes and 1794 words in a 3-week experiment. Furthermore, we also found that all students can improve their reading speed with online SDER support; however, the benefits varied by the engagement of online SDER. All students increased their reading speed by 33 words per minute (WPM) from 99 to 132 WPM in a 1-year experiment. Among all students, the high and low engagement groups in online SDER learning increased their reading speed by 40 WPM (100 to 140 WPM) and by 27 WPM (97 to 124 WPM) respectively.

The results emphasized both SDL ability and the use of online SDER support with LEAF played critical roles in ER in English learning. The online SDER support with LEAF could foster students' learning achievements and their development of SDL ability in the context of language teaching and learning.

AI Recommendation for Language Learning With LEAF

This section describes an application of recommendation module in LEAF for language learning, which aims to support students' self-directed extensive reading. ER activities may have some issues in the difficulty of book selection and low-quality learning paths if they are

conducted without any recommendation. To solve them, we can use an explainable AI book recommendation (Takii et al., 2021), which is integrated into the LEAF system. Since the recommendation is based on a wordlist and the difficulty of vocabulary, this recommendation can be used not only for books recommendation but also for various materials.

Problem and Our Proposal of AI Recommendation in Language Learning

We raise a book recommendation for ER as one of the applications of LEAF to language learning. ER is one of the methods of learning foreign languages, in which learners read as many books as possible without considering words and phrases they do not know. However, there are some issues on introducing ER to educational practices. First, students may not be able to choose books suitable for their English levels. While students are given a lot of choices of books for the ER, they may have difficulty in choosing appropriate books due to the information overload. Since books that are too easy or difficult for students apparently have a negative influence on their learning, and would not delight the students, a book recommendation system is of great importance for the students. Second, even if the recommendation is introduced, the recommendation may not be persuasive enough for students to accept. Therefore, the book recommendation should provide them with not only recommendations but also explanations why these books are recommended to them.

We developed an explainable English material recommendation for ER programs to handle these issues. In our AI recommendation system, students can receive recommendations on e-books whose difficulties fit their English skills. Besides, they are provided with sentences that explain why these recommendations are made for them.

Recommendation Flow and Mechanism

First, teachers prepare in advance a wordlist and books for ER in the data storage. This wordlist has information on vocabulary and its difficulty, which is used to estimate the difficulties of books. Next, learners read books with an e-book reader system (BookRoll in

our case). This system can send learners' activity logs to LRS, a general repository for learning/education records. The data in LRS are sent to the book recommender system, and using them and book data, the system generates personalized book recommendations for each learner. Generated recommendations are displayed on a recommendation UI and provided for the learners. Figure 11 shows the simple flow of the usage of the recommender system.

Figure 11

Workflow of Utilizing the Recommendation Module in LEAF

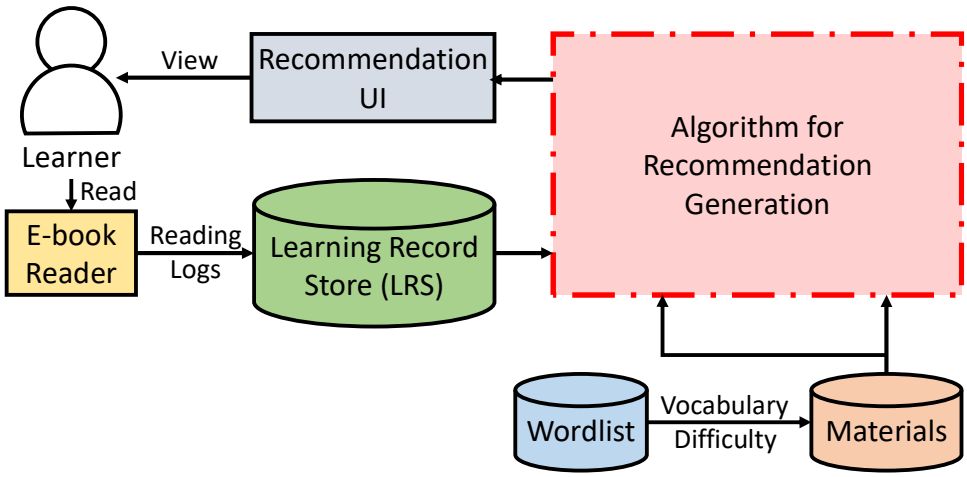
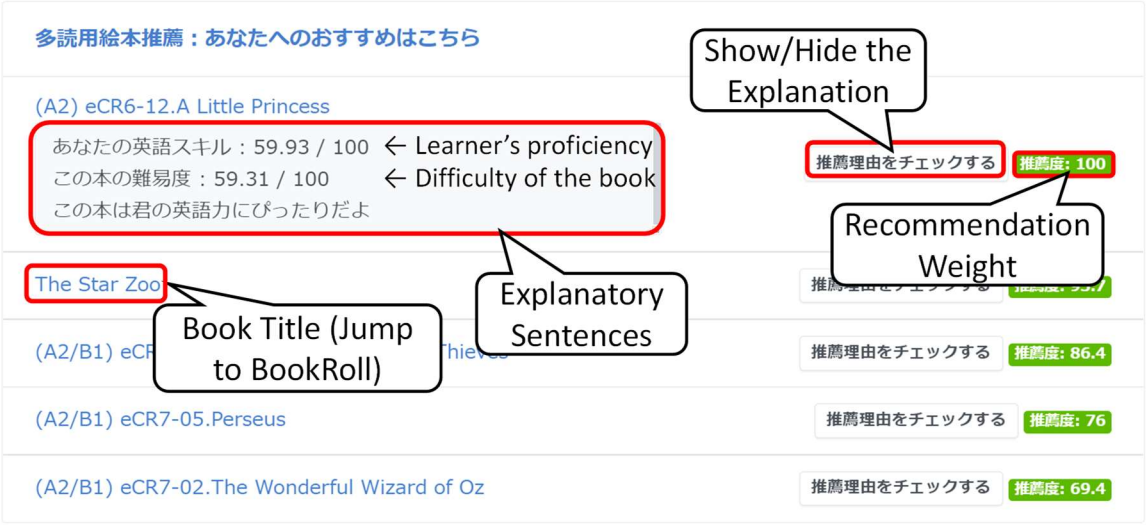


Figure 12 shows a recommendation panel in the learner dashboard. This panel provides learners with recommended book titles, recommendation weight (a value that shows how highly the book is recommended), and explanatory sentences that explain why this book is recommended for the learner. This book recommender system recommends books whose difficulties are as close to learners' English skill levels as possible. Since the explanatory sentences describe the learners' English proficiency levels and the difficulty of the recommended book, the learners can understand why these recommended books are appropriate for them.

Figure 12

Recommendation Panel in the Learner Dashboard



Application of the Recommendation in K-12 Schools

The AI recommendation has been introduced to a junior high school in Japan from 2022, and more than 100 students have used it until now. Students can read more than 500 e-books in BookRoll through the AI recommendation and they can use the recommendation anytime at their own pace. We have conducted a case study to compare the difficulty of the recommended e-books with the student's level of English skills in self-directed extensive reading (Takii et al., 2022). The comparison shows that the average difficulty of the recommended books was very close to the student's English skill level. We are investigating how effective the recommendation was on the students' learning behaviors, achievements, and skills in the ER experiments in K-12 settings.

Although we described the application of the recommendation to ER learning, this recommendation can be used in more general contexts. This is because the recommendation algorithm is based on a wordlist and the difficulty of vocabulary, not on the content of the e-books. Thus, the course administrator can apply this recommender system not only to the recommendation of graded reader books, but also to that of various materials; for example,

English textbooks, reference books, and even English vocabulary or grammar quizzes. This recommendation can be used to simply have the learners enjoy reading and to have them learn English effectively and efficiently. By using the recommendation to choose appropriate materials, the learners will learn English with less stress and improve their skills effectively.

Reading-based Online Group Work with LEAF

Many researchers have conducted collaborative learning in English reading scenarios. Some inspected the language learning process with the scaffold of group work designs (Mouri & Ogata, 2015), and others investigated the impact of collaboration on reading achievement as an outcome (Arisman & Haryanti, 2019). These studies demonstrated several possibilities for group work in flipped language learning classrooms (Acarol, 2019). However, fewer studies focused on group formation strategies using learner attributes before group work. Therefore, LEAF elicited opportunities to task from a data-driven perspective.

Figure 13

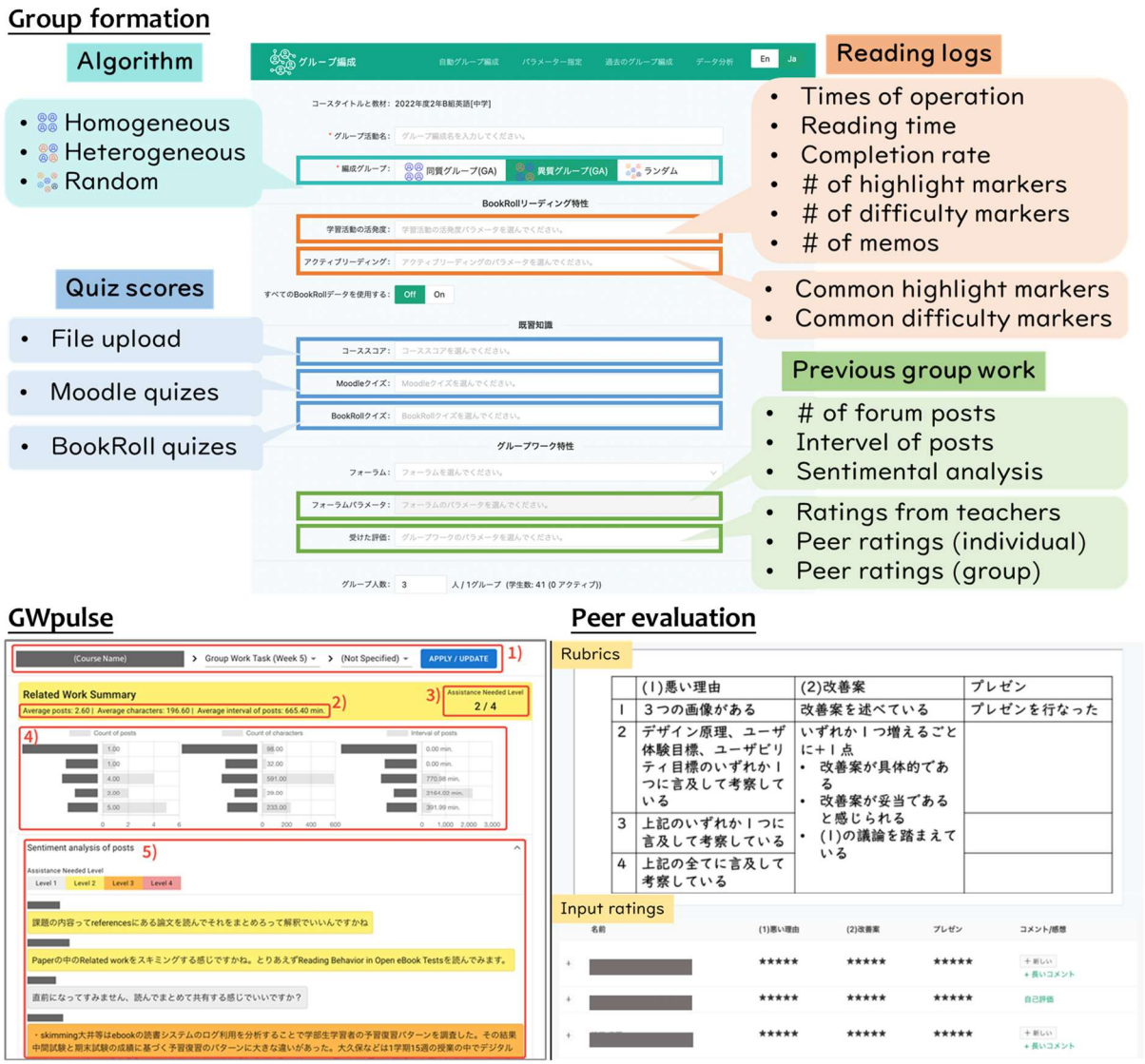
General Workflow of Reading-based Group Work with LEAF

Figure 13 shows example procedures for group work implementation using online reading logs with LEAF, and Figure 14 shows group work modules in LEAF. In a general workflow of reading-based group work, first, learners do some reading tasks and create some reading data in BookRoll. Before the group work, teachers can use data recorded by behavioral sensors in LEAF as evidence to create groups using the group formation system (Liang, Majumdar, & Ogata, 2021). During the group work, the teacher and students can check the performance in the forum discussion in GWpulse, a system that can display the

basic statistics of the students' forum activities such as time interval and the number of posts, as well as "Assistance Needed Level" for teachers based on sentiment analysis (Nakamizo et al., 2022). In the evaluation phase, it is possible to conduct peer evaluation among students in the Peer evaluation module for rating and commenting on the peers' group work by students (Liang, Toyokawa, et al., 2021). The results of these evaluations are fed back to each student and stored in the LEAF data repository, as evidence for subsequent group formation and other learning analytics tools.

Figure 14

Group Work Modules in LEAF



English Reading Course in Kyoto University

At the university level, academic reading courses are universal in Japan, where students read literature in foreign languages (Majumdar, Bakilapadavu, et al., 2021). In this work, we shall share findings of applying LEAF for group formation from the university context. The case showed a university academic reading course in Japan in 2022. Thirty-six students registered for the course at the beginning, and 25 finished the whole course and got a final course grade. During this course, group work was implemented weekly from week 3 to week 11 across the 15-week semester. Students were grouped five times by the group formation system (Liang, Majumdar, & Ogata, 2021) across the course using different group formation inputs for assorted academic reading topics.

The group work design followed the general workflow presented in Figure 15. For each week, students read several articles in English on BookRoll. Then, they should share and discuss their reading progress with their group members in the Moodle forum and prepare a brief presentation of their reading outcome as a group for the next class. During the course, each group made presentations, which were evaluated by the audience (both the instructor and students) using the evaluation system of LEAF. In the meantime, students made peer ratings of their group mates in the peer evaluation system.

Figure 15

Workflow of the Reading-based Online Group Work in University Course

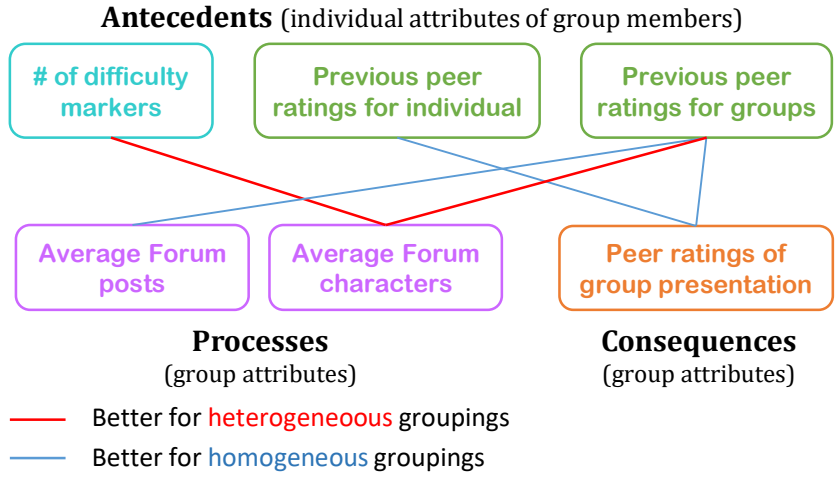
In this study, we considered individual-level and group-level attributes to inspect predictive input for algorithmic group formation to assist teachers with optimal group creation in the online reading course. Data collected across the eight activities from 36 students were analyzed using correlation.

Relation Between Input Attributes and Group Work Performance

For individual attributes, we found that reading engagement in BookRoll and peer ratings from group members can reveal learning achievement of the course indicated by the forum participation and final course grade. The finding can guide group formation settings and intervention suggestions in similar language learning contexts with academic reading. For group-level attributes, a homogeneous grouping strategy based on reading annotations and received previous group work ratings can predict desirable performance for a group, which can elicit guidance for subsequent group formation (see Figure 16). Meanwhile, heterogeneous grouping based on the difficulty markers can facilitate more detailed forum discussions with more characters in forum posts. The results can assist teachers with appropriate group formation strategies in the data-driven environment of LEAF.

Figure 16

Suggested Grouping based on Correlations between Group-level Attributes



Discussion and Conclusion

We provided an overview of the various teaching and learning activities that LEAF platform can support by using the e-book reader, BookRoll and by utilizing the reading behavior logs for various data-driven services in LEAF. For teachers functions such as automatically recommending books based on the reading patterns of students can help reduce their workload to choose the appropriate level of books for each student. Even for learners picking recommended books which match their level can potentially make choosing a particular book and reading it less stressful. As the recommendation is based on a knowledge map it additionally aims to maximize their vocabulary learning by providing books that have vocabularies in their zone of proximal development. Learners can plan, monitor and continue their daily reading habits by reflecting on the visualized data in the learning analytics dashboard and using tools such as GOAL. We found it improves motivation to continue reading and also improves students' reading speed in words per minute (WPM) over a longer run. The GOAL tool can also help teachers to monitor the progress of group or individual students through a dashboard. We recommend using BookRoll to share daily reading based learning activities and GOAL tool as support to complete them in a self-directed manner.

Using data in the context of language learning further helps to support the metacognitive aspects of learning. Specifically for reading, visualizing the process indicators such as content navigation patterns and artefacts of annotations that the students create can be used by the teachers as well as students in the LEAF platform. Implementing active reading (AR) strategies in BookRoll helped to improve learners' reading performance (vocabulary and reading comprehension) of new text. While learners used the AR dashboard, they could compare their reading behaviors with their peers as well as from their previous learning episodes. Teachers can use the dashboard to decide subsequent actions and also use it as part

of pedagogical design. For instance, they can use the visualization of the highlighted yellow markers to discuss any part of the text that needs further clarification in class. The group formation module can help the teacher easily form groups for cooperative learning activities. It can optimize group members automatically based on accumulated learning evidence from their previous online learning context utilizing the collected learning logs.

While the functions and tools in the LEAF platform are meant to be simple, yet often we have seen teachers needs some time to integrate meaningful learning activity that can be complemented by the power of learning analytics. Various data-driven services, such as the recommendation function, can build more robust models with the increase in data logged within that system in a specific context. Hence in a longer run it becomes easier to conduct evidence-based practices with the student learning logs. Members of the research team prepared feature manuals and scenario videos for teacher training for easier onboarding. However in the university learning context, students who didn't log in the LEAF platform also missed any of the data-driven services. We recommend starting with simpler tasks and immediate feedback to students using the dashboard in Log Palette as a good starting point.

The possibilities of data-driven services are immense by utilizing digital learning tools. LEAF platform is one of them to realize the potential and hence is under active development. The algorithms and features are periodically updated based on the results and feedback from the implementation studies. Our efforts focus on extracting good practices that emerge from the real-world data gathered as learning interaction logs and enabling evidence-based practices based on that.

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Selected Papers

Practitioner Report

The Horizon Report: What can we Learn About Educational Technology Trends?

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Abstract

The Horizon Report (Pelletier et al., 2022), published by Educause, is an annual survey of global educational technology trends and forecasts for the future. This proceedings paper summarizes the main points of the 2022 version which are applicable to JACET members. These include: 1) social and technological trends such as an expansion of hybrid and online learning, and an increased use of data analytics; and, 2) the influence of three technology-based practices: artificial intelligence (AI) for learning; hybrid learning spaces on university campuses; and the development of micro-credentials. Language teachers working at Japanese universities were asked whether the results of the Horizon Report were resonant with their experience. The participants thought that the results were relevant to Japan, especially concerning online teaching and the development of micro-credentials. In addition, the challenge of working with machine translation tools was highlighted as being particularly important for language teachers. The survey results suggest that the Horizon Report is a useful guide to help plan for the use of educational technology in higher education and that it can be used effectively to identify specific training needs for teachers in such institutions.

Keywords: Horizon Report, technology trends, AI, hybrid, micro-credentials

Educause is a nonprofit membership organization based in the US. It was established in 1998 with a mission "to advance higher education through the use of information technology," and has over 100,000 members worldwide, including 242 institutional members outside of the US (Educause, 2022). Educause annually publishes The Horizon Report (Pelletier et al., 2022) which summates and predicts technological trends worldwide that could influence the future of higher education. This is particularly important as the pandemic of the last three years has digitally transformed education across the globe (Turnbull et al., 2021). The purpose of this paper is to inform JACET members about the contents of the current Horizon Report and to examine whether such a systematic summary of technological developments can be applied to Japan. The paper is divided into two sections: 1) a summary of the report; and, 2) a discussion of the results of a survey on how the report is relevant to higher education in Japan.

Summary of the 2022 Horizon Report

The Horizon Report is compiled each year by a number of expert panels. These experts meet independently and by using the Delphi method of forecasting (Page et al., 2015) identify what they think are the most important trends in educational technology that are currently affecting and will affect higher education. The Delphi method relies on experts who give opinions which are revised and refined through a number of rounds of summaries and questions. The 2022 version lists 63 experts, including one representative from Japan, that contributed to the report. These experts in turn recruit a number of further participants who, through various brainstorming and evidence gathering procedures, try to identify trends in their region. The authors of this paper took part in the Australasian version of this process in November 2021 and again in February 2022 (ASCILITE, 2022). This was a voluntary process in which members of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE) were invited to join an online discussion about the Horizon Report. It

is one example of a regional group contributing to the global survey. The main trends that this sub group reported are listed in the Appendix.

Once all the different opinions from the various expert panels are compiled and analysed, the results of the global survey are written up into the final report. This is divided into four main areas:

1) Social, Technological, Economic, Environmental and Political (STEEP) trends

2) Key technologies and practices

3) A forecast of possible impacts

4) Regional case studies/essays on the implications of the technology trends

In the next section, the first two of these four areas will be briefly described with a focus on the main ideas that are most relevant to JACET members.

STEEP Trends

Firstly, at the "big picture" level, the Horizon Report frames change in higher education within five, often overlapping, categories: Social, Technological, Economic, Environmental and Political (STEEP). STEEP is a commonly used framework for analyzing strategic factors that may affect future design (uts.design, 2022). Table 1 summarizes the main trends that were identified in the 2022 report.

Table 1

STEEP Categories and Main Trends in 2022

STEEP Category	**Main Trends**
1. *Social*	*Hybrid/Online*; Skills-based Learning; Remote Work
2. *Technological*	*Different Modes of Teaching; Learning Analytics;* Big Data; Cybersecurity
3. Economic	Cost/Value of Degrees; Digital Economy; Financial Deficits
4. Environmental	Campus Change; Increase in SDGs; Planetary Health
5. Political	Uncertainty in Higher education; Ideology and Pedagogy; Decreases in Funding

Adapted from The Horizon Report (Pelletier et al., 2022).

As the first two categories, social and technological, are directly concerned with teaching and learning they are the ones that are thought to be most pertinent to JACET members. Detailed descriptions of these trends are given below focusing on ones with the most direct pedagogical impact (highlighted in italics). The other three categories, economic, environmental and political, are all extremely important but as they are not so directly concerned with pedagogy are not discussed here.

Social

The first category of trend is social; that is teaching and learning takes place within the interactions that teachers and learners have in social contexts. The COVID-19 pandemic has had an enormous impact on this social context from early 2020 onwards, especially in how lessons have been completely reorganized to minimize face to face contact on university campuses. As a result, “hybrid” and “online” are terms that most educators in Japan are now

very familiar with as they have had had direct experience of these modes of teaching. The Horizon Report predicts that hybrid and online will continue to have a major effect (Pelletier et al., 2022, p. 7).

The Horizon Report defines hybrid as being a combination of some students attending a lesson face to face and others participating remotely; that is a mix of face to face and online at the same time. This particular teaching approach is the most challenging for an institution and teacher to organize well as it involves considerable investment in equipment and a high level of pedagogical skill (Pelletier et al., 2022, p. 23). Wholly online lessons can be divided into synchronous or asynchronous. The former will probably involve video conferencing using applications such as Zoom or Microsoft Teams so that the teacher can communicate directly with students and vice versa. For asynchronous, or "on-demand," lessons teachers are expected to create materials that can be used autonomously by students and provide timely feedback on the tasks that students are required to do.

This predicted trend towards a continuation of hybrid and online learning has many implications that institutions need to plan for, such as adapting classrooms, being flexible about schedules, and accepting of remote working. One pedagogical issue is that of how to best maintain levels of student engagement with fewer face to face interactions. Educators need training in online teaching and materials development in order to create an experience which does not just substitute for the classroom but actually takes advantage of the online experience to fully engage students. This can take many forms including increased flexibility with tasks and assignments, greater use of multimedia, and personalized feedback.

Technological

The second STEEP trend examines in more detail the technological innovations that are impacting teaching and learning in higher education. After a period of "emergency remote teaching" (Bozkurt et al., 2020) that began in 2020, many higher education institutions may be looking to go back to their previous, more familiar mode of working on campus. However,

the Horizon Report (Pelletier et al., 2022, p. 26) predicts that different modes of teaching and learning will become further embedded in higher education, as with hybrid and online mentioned above. Institutions will need to define what these different modes of teaching are and then plan for and invest in them: hybrid, hyflex, and blended classrooms are just some of the online teaching approaches that need different equipment, applications and training for staff that differentiates them from traditional face to face lessons.

A connected technological trend is the use of learning analytics, which is "the measurement, collection, analysis and reporting of data about learners in their context, for purposes of understanding and optimizing learning and the environment in which it occurs" (Siemens & Long, 2011, p. 33). Most institutions now have Learning Management Systems (LMSs) in place such as Moodle, Manaba, and Blackboard. These systems incorporate analytics that could be used to support student learning; for example, by increasing the personalization of the curriculum or by identifying students at risk of falling behind. However, the potential to use this information is not, at the moment, always fully realized as many staff do not have the expertise to use the systems well. This is more fully explored in the next section.

Key Technologies and Practices

Building upon the broad STEEP trends, the Horizon Report details six key technologies and practices that it forecasts will be most important in higher education in the near future (Table 2). These in turn can be divided into three areas: artificial intelligence (AI); hybrid; and, micro-credentials.

Table 2

Key Technologies and Practices in 2022

Key Technology or Practice	Example Uses
1. Artificial Intelligence (AI)	AI for Learning Analytics
	AI for Learning Tools
2. Hybrid	Hybrid Learning Spaces
	Mainstreaming of Hybrid and Remote Learning
	Professional Development for Hybrid and Remote Learning
3. Micro-credentials	Development of Micro-credential Courses

Adapted from The Horizon Report (Pelletier et al., 2022).

AI for Learning Analytics and Learning Tools

AI is now ubiquitous all around us, ranging from automated email reminders to voice recognition devices and chatbots (Shadiev & Yang, 2020). The Horizon Report (Pelletier et al., 2022, p. 20) identifies two areas in which AI is having a particular impact on higher education: for learning analytics and learning tools.

As discussed above, there are learning analytic systems built into LMSs which can track student work in many ways: time spent on tasks, completion dates, satisfaction rates and so on. Such data can potentially be used to monitor student progress, identify students who are at risk of falling behind, assess the merits of materials and tasks, and improve course design. The implications of this trend in AI are that institutions and staff need to be aware of the potential uses of data analytics and trained in how to use it. Furthermore, institutions need to also be aware of the potential negative aspects of learning analytics such as privacy issues

(Roberts-Mahoney et al., 2016), and a reductionist view of students as statistics rather than being seen as individual people (Reinders, 2018).

The second use of AI is for creating digital tools which students can use to support their learning. Two examples of such tools that the Horizon Report (Pelletier et al., 2022, p. 22) describes that are of particular relevance to JACET members both support academic writing. One is Aca Writer (https://acawriter.uts.edu.au) which has been developed by the University of Technology Sydney, and the other is Automated Feedback (https://feedbackfruits.com) from the company Feedback Fruits in partnership with Erasmus University Rotterdam, and Rotterdam University of Applied Sciences. Both tools can be used by students to identify problems and errors in their writing and also to receive comments and suggestions to improve their work. Writing teachers typically spend much time giving feedback on basic grammar errors or organizational weaknesses. It is claimed, therefore, that these AI tools can free up teacher time to focus on higher order issues connected to writing such as the ideas and the logic of a writer's argument (Godwin-Jones, 2022).

Students can access such AI-based tools themselves or they can be bundled with an institution's online student support system. The choices that teachers face are to know what kinds of tools their students are using and how to use them in the most effective way. As with learning analytics, teachers need information and training on how best to take advantage of such technology. Perhaps the most obvious AI tools that language teachers and learners are aware of are those of machine translation such as Google Translate (https://translate.google.com) or DeepL (https://www.deepl.com/translator). There is much debate at the moment as to how best to use these tools that can save so much time and effort in language learning (Zhang & Torres-Hostench, 2022). At the same time, however, they can prevent students engaging fully with a foreign language if the tools are only used as a crutch without understanding how to use them in a way that is beneficial for language learning.

The second major technological practice is that of hybridity. The Horizon Report highlights how hybrid learning spaces are now being developed in many institutions in order to respond to the needs of remote students and those on campus (Pelletier et al., 2022, p. 23). This form of learning has been present for many years (Porter & Graham, 2016) but is becoming mainstreamed due to the demands of the pandemic. Institutions face the dilemma of whether to go back to their traditional face to face context or include online methods in some way. As a result, those institutions that do decide to do both need to find effective ways to transform some of their learning spaces into hybrid ones. This will involve considerable investment and know-how in making classrooms suitable both for on-campus and remote students. It will typically involve creating conditions with cameras, monitors and speakers in which both sets of students can easily communicate with each other and where a teacher can give equal attention to both sides. It will, in short, require "new ways of thinking about teaching spaces" (Bryant, 2022). In addition, institutions need to provide training and professional development for staff in how to use those teaching spaces in the most effective pedagogical ways.

Micro-credentials

The third important technological practice is the steady development of micro-credentials. These are short, usually online, courses that students can take in their own time and at their own pace rather than registering for a longer and more rigid macro-credential such as a degree (Oliver, 2019). They are particularly useful for workers who wish to upskill or reskill in a rapidly changing employment market. The most common form of micro-credential is that of Massive Open Online Courses (MOOCs) which are increasing rapidly (Shah, 2020). Recently many MOOC providers have teamed up with higher education institutions to provide micro-credential courses. One example is Future Learn in the UK which has a large number of university partners worldwide providing a huge variety of courses and materials, including language teaching. In order to create these courses,

universities need personnel who are skilled in online learning design and have multimedia experience. With many regions and individual countries investing heavily in the development of micro-credential systems (Cowie & Sakui, 2022) it seems that micro-credentials will soon offer a practical alternative to degree courses. Higher education institutions can see this as a threat or an opportunity in how they might react to this development. As a threat, micro-credentials can divert students away from universities; but as an opportunity, universities can offer a wider range of courses and diversify their student base.

How is the Horizon Report of Relevance to Japan?

The Horizon Report provides a framework to help higher education institutions plan for the future in terms of investment in educational technology tools and practices. Although the expert panels that create the report are based in many countries, there is relatively little input from Japan-based scholars and the report's findings do not mention any Japanese examples at all. So, how relevant is it to the Japanese context? In order to try and answer this question the authors carried out a small-scale survey of university teachers in Japan to gauge their reaction to the Horizon Report.

At an academic conference in Japan in June 2022 (Cowie, 2022), the contents of the Horizon Report were explained to 20 university language teachers. These teachers discussed this information and wrote their responses to it on post-it notes which were displayed so all participants could read them. In a mini version of the Delphi technique the teachers then voted on the responses that they most agreed with. In this way reactions to the report could be collected and analysed. Below are some of the post-it note quotations that received the most votes and which reflect the ideas that those teachers based in Japan think are important. These include general trends concerning online teaching at university; the potential of micro-credentials; and the influence of machine translation.

Firstly, the Horizon Report points to the trend for higher education institutions to try to learn from the experience of rapidly going online during the global pandemic (Pelletier et al.,

2022, p. 32). Japan is at risk of losing the experience and diverse opportunities that this unexpected development provided. The survey participants emphasized the need to continue with online teaching despite the current pressures to return to pre-pandemic methods: "The Japanese government should take into account the knowledge teachers and students have gained technologically to allow certain courses to remain online. This is tied to all 5 points in STEEP." However, there are concerns that Japanese universities are not training teachers well enough to allow this to happen and that continuing faculty development is vital: "Teachers need new skills [as] they are no longer knowledge providers because of AI."

Secondly, there was an awareness that as micro-credentials are becoming more important teachers need to adapt in order to be part of that change: "More students will choose to learn online outside university. Less teachers will be needed." "We need to provide micro-credentials for students but do we have teachers qualified to do this?"

Finally, one specific trend of significance to language learning is the increasing influence of machine translation: "How we learn foreign languages need to be shifted. We need to incorporate and embrace AI based translation systems into our classroom."

So, what are the implications of these reflections on educational technology trends in Japan? The participants concluded that the Horizon Report is an excellent summary of important influences and developments in the field of educational technology. As such it is an extremely useful resource to aid higher education institutions to plan for the future. However, it needs to be adapted to regional contexts wherever appropriate. In Japan, it would seem one major priority is to support university teachers with training and information about the most important trends that will affect them in the near future. As part of this kind of initiative there needs to be a clear debate on what kind of skills and knowledge institutions would like to provide their students with. Unfortunately, both institutions and individual teachers are limited in what they can do if current calls for "back to normal" (Garrett et al., 2022) create uncertainty as to what direction digital education can go.

Conclusion

Based on the 2022 Horizon Report, this short paper has described the most recent educational technology trends and practices that are predicted to influence higher education in the near future. These include social and technological trends such as hybrid and online teaching, the increasing use of learning analytics as well as AI, hybrid learning spaces and micro-credentials. A sample of academics based in Japanese universities confirmed that such trends are relevant to Japan and that university teachers need to adapt to a rapidly changing digital landscape. Three aspects of particular focus are how to continue to implement future online teaching, how to provide micro-credentials, and how to face the challenge of using machine translation to support student learning. It is hoped that this information is useful to JACET members and can aid them in planning for technological developments in the near future.

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Appendix: ASCILITE's Contextualising Horizon Initiative 2022 (February 15th, 2022)

The following were the top seven educational technology trends in the Australasian region in 2022 (ASCILITE, 2022):

1. Redefinition and interrogation of longstanding pedagogical practices (e.g., lectures and exams)

2. Self-care and well-being for staff and students

3. Blended models of learning

4. Ed tech infrastructure to enable learning

5. Accessible content and digital equity

6. Co-design for higher education

7. Micro-credentials

The Impact of a Curriculum-based Formative Assessment on EGAP

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Abstract

Formative assessments can lead to increases in learning outcomes by helping students to recognize their shortcomings in order to overcome them. Though formative assessments are generally handled within individual classes, this study reports on a formative assessment that was created for the skills mandated in a university-wide curriculum. Students took the assessment on a voluntary basis after their summer vacation and then were provided with feedback about how well they performed on each of the skills they were meant to have mastered in their first semester. Based on their scores, individualized advice was also given to each student regarding how to improve at the skills they did not score well on. We used pre- and posttest TOEFL ITP® scores to determine how much improvement students at the university exhibited, and then compared the delta scores of those that took one, two, or no formative assessments and gathered student opinions via survey to observe how much impact the formative assessment tests had on general English improvement. We found that the formative assessment tests had a discernable, albeit weak, positive influence on improvement, and concluded that we need to provide even more feedback in the future.

Keywords: Formative assessment, curriculum, impact, learning outcomes

Formative assessment (FA) is a somewhat loosely defined term that constitutes a number of different methods used to evaluate students' learning, needs, or progress during their learning process. The largest distinction between formative and other types of

assessment is that the goal of FA is not to rate learners for the purposes of ranking or grading, but rather to help teachers and students identify the problems that learners are having so that they may focus on these areas and receive assistance as necessary (e.g., Black & Wiliam, 2009; Gardner, 2012). Though FA is generally thought to be a part of a shorter-term learning period, i.e., a lesson, class, or course, it can theoretically also be applied to longer-term learning periods if the goals are clear to the students.

As of April 1, 2020, Tohoku University revised its general education English curriculum, and mandated specific EGAP (English for General Academic Purposes) skills that students are expected to learn in four classes taught over two semesters in their first year, as outlined in their designated textbook, *Pathways to Academic English, 3rd Edition* (Spring, 2021). However, in transitioning from the first semester to the second, teachers do not always know how well students acquired the skills outlined in the first semester. Furthermore, students are not necessarily aware of their skill level. Finally, it is also conceivable that students might lose some of their skill over the summer break between first and second semester, as has been reported in other studies (e.g., Bardovi-Harlig & Stringer, 2010). Therefore, we devised a formative assessment that students could use at the beginning of their second semester courses which would: (1) alert students to their level of mastery of each of the skills from their first semester, (2) provide students with constructive feedback based on their scores, and (3) alert teachers to the first-semester skills acquisition levels of their students. While such an endeavor could theoretically be helpful to students and teachers, the impact on the learning outcomes of the general student body is unknown, so this study seeks to evaluate how meaningful the curriculum-based formative assessment given in 2021 at Tohoku University was.

Literature Review

Although a number of different treatments could technically be considered FA, we adopted the following general guiding principles for the treatment: it should be (1) done in the middle of learning (i.e., not at the beginning or end), (2) used for the purpose of facilitating learning rather than simply evaluating the final end point, and (3) used by teachers and learners to revise learning effort (Black & Wiliam, 2009; Dick & Carey, 1996; Gardner, 2012; Mahshanian et al., 2019). Thus, most reports of FAs focus on in-class activities that help students to notice their weaknesses and revise their learning strategies accordingly (e.g., Dalby & Swan, 2018; Kluger & De Nisi, 1996; etc.). However, taking a broader definition of FA, following works such as Harris and McCann (1994) and Ketabi and Ketabi (2014), a treatment mid-semester, between classes, as proposed by this study, could also be considered formative as long as its purposes are to facilitate student learning and revise student or teacher efforts. Based on this premise, we created our FA to be a no-stakes test that students could voluntarily take to help them realize how well they acquired the skills of their first semester courses before the start of their second semester courses. Furthermore, we endeavored to create feedback that would encourage students to review the areas that they had difficulty with, and informed participating teachers of their students' strengths and weaknesses.

Since FAs are, by definition, designed to influence learning, feedback is a critical component. Specifically, any feedback provided by a FA should be aimed not only at helping students realize their current level of acquisition, but also at promoting planning and action to improve in the future (Black & Wiliam, 2009). Furthermore, works such as Kluger and De Nisi (1996) suggest that any feedback from a FA should be of low-threat to students' self-esteem, as harming their self-image may demotivate them, which would not result in the desired effect of adjusting learning strategies or redoubling effort. Therefore, it follows that any such advice should likely be as low-risk as possible, and should be focused on positive action, such as suggestions of what to do going forward. Finally, Gardner (2012) says that

feedback should ensure accountability for progress, and thus should likely be continual. The feedback created for the FAs put forth by this study could be used to influence teacher and student activity and made without posing unreasonable threat to self-esteem. However, as they are designed to be given once, it is difficult to know how much they could really ensure accountability for progress.

Another issue to consider when providing feedback for FA is the use of technology to provide feedback. Though technology can provide feedback for several aspects in EFL such as pronunciation (e.g., Guskaroska, 2020; Spring & Tabuchi, 2022) and writing (e.g., Gao & Ma, 2020; Shang, 2022), some studies suggest that automated feedback alone is not as effective as feedback from peers and instructors (e.g., Link et al., 2014; Wu et al., 2022). However, there is less data available regarding automated feedback specifically within the realm of FA. For example, Dalby and Swan (2018) integrated technology into their FA feedback, but this was implemented in a mathematics course, rather than EFL, and relied heavily on teacher input, so can hardly be considered automated. Sheard and Chambers (2014) used multiple-choice style questions to provide FA for EFL students' writing, but the only feedback this provided was whether or not answers were correct. More recently, Alharbi et al. (2021) examined the effects of FA-based feedback given via Google Forms on EFL learners, finding that they provided a positive impact on both teachers and students, but their study focused on in-class assessments rather than curriculum-wide efforts. Therefore, it is not known how impactful the automated feedback provided by a one-time curriculum-wide FA, such as the one proposed by this study will actually be.

Finally, there are a few studies that suggest that curriculum-wide FAs can have some positive impact on language learners. For example, Mahshanian et al. (2019) suggest that a FA focused specifically on learner strategies increased students' summative EFL abilities later in a curriculum-wide effort. Similarly, Kato (2009, 2020) found that a program that

helped students to set goals and self-assess enabled L2 Japanese learners to attain higher proficiency over the course of their university studies. However, other studies have found that FA practices do not always impact student learning as intended or designed (e.g., Widiastuti et al., 2020). Finally, Sakurai et al. (2021) examined the use of a curriculum-wide FA on L1 Japanese EFL learners' final learning outcomes reporting that the FA seemed effective, but only to a very minor degree. However, they were unable to take pre-treatment data, which leaves the impact of their FA somewhat unclear.

Research Questions

Based on the suggestions of the studies mentioned above, it is possible that a one-time FA given between first and second semester classes in a one-year EFL curriculum might have a positive impact on learners. However, it is unclear how strong the impact will be, and if completely automated feedback will actually have any influence on learners. Therefore, this study seeks to fill in the gaps of previous research by answering the following questions:

1. Does taking a formative assessment of first semester skills at the beginning of a second semester course have a discernable impact on learning outcomes in an EGAP-based EFL curriculum, i.e., positive change in TOEFL ITP® scores?
2. How well did the feedback work to encourage learners to revise their learning strategies, i.e., review skills that they had not acquired well?

Method

Creating Formative Assessments

Two FAs were created for use at the beginning of the second semester at Tohoku University in 2021, one for reading and writing courses, and one for speaking and listening courses. According to the curriculum designated by Tohoku University, which is outlined in *Pathways to Academic English* (students' textbook; Spring, 2021), in the first semester reading and vocabulary class, called "English A1," students should have learned four skills:

word parts, synonym vocabulary, skimming and scanning, and paraphrasing and summarizing. In the first semester speaking and listening class, called "English B1," students should have learned: note-taking while listening, orally summarizing from notes, interrogatives and giving opinions, and phrasal verbs and idiomatic expressions. Each FA consisted of 20 questions, ten of which were knowledge-based (i.e., based on specific phrases or words that students were asked to learn), and ten were skills-based (i.e., reading or listening questions that students should be able to solve if they had mastered the aforementioned skills). In an attempt to better observe students' skimming and scanning ability, students were also asked to report how long it took them to complete the skills portion of the A1 FA.

Automated feedback was given to each student using a modified Google Spreadsheet and the grading and grade-sharing add-on Flubaroo (https://www.flubaroo.com/). A score for each individual skill in the FAs was calculated, and one of three pieces of advice was given for each skill based on the score. Students who scored over 80% for the questions on a particular skill were told that they had mastered that skill to a satisfactory amount, students who scored between 50% and 80% were told that they had some mastery, but that they should work to improve the skill by using the materials and resources from Tohoku University and those suggested by the Educational Testing Service (2019). These materials include a number of reading, listening, ASR-based speaking, and online-writing activities that are provided to teachers and students though a designated website that accompanies the *Pathways to Academic English* textbook, providing practice on the specific skills outlined within it (www.pathwaystoacademicenglish.com). Students who achieved less than 50% on a given skill were told that they should work to improve the skill by reviewing their textbook and using specific Tohoku University materials. The same guideline was followed for assessing the skimming and scanning skill, but the cut-off points were set at a reported time of having

finished the reading section within 10 and 13 minutes, respectively, instead of a percentage of correct answers.

In order to ensure that the feedback would be as low-threat and low-risk as possible, the feedback was given with positive wording and focused on providing advice and guidance rather than being critical of students (i.e., Kluger & De Nisi, 1996). For example, rather than telling students that they did poorly at a particular skill, the feedback for poor performance was "You have some ability to summarize and paraphrase but can still improve. However, you did better at summarizing than paraphrasing. Consider rereading Chapter 4 and try practice paraphrasing more by using the online paraphrasing tool found on the Pathways to Academic English website (<link>)." General percentage scores for each skill were also given to the students, but information regarding which questions they missed and the correct answers was not given, as the purpose of the FAs were to alert teachers and students to individual skill levels and encourage students to improve in areas that they were lacking in (e.g., Black & Wiliam, 2009). Teachers could also request their students' FA scores and they were distributed to several teachers. Since the FAs were designed to be taken on a volunteer basis, we were largely unable to hold students accountable to future action (i.e., Gardner, 2012), but instructors could adjust their courses based on FA scores as necessary.

Implementation and Participants

Students studied in their A1 and B1 classes in the first semester (from the middle of April to the beginning of August) and then had a summer break from early August to the end of September. The FAs were created in Google Forms and students were given a link to them. Teachers told students that they could do the assessments outside of class time and that they would be given feedback based on their scores. Second semester teachers of A2 and B2 classes, respectively, were asked to give the links to their students, but some refused (see the Discussion section for further details). Furthermore, some teachers gave the students the link

and told them participation was on a voluntary basis, while others told their students that participation was required for their classes. Accordingly, participation varied greatly, resulting in the following participation rate: 232 students took only the A1 FA, 196 took the B1 FA, 217 took both, and 1774 took neither.

Assessing Meaningfulness

We monitored the impact of the FAs mostly through two means: (a) change in TOEFL ITP® scores, and (b) student surveys (see Appendix A). Students at Tohoku University took the TOEFL ITP ® in the middle of May, and again at the beginning of December. Though both tests were conducted part-way through the first and second semesters, respectively, we used the change in these scores (i.e., the delta scores: posttest score – pretest score) as an indicator of learning outcomes. We used the change in TOEFL ITP® test scores because the test is designed to evaluate EGAP, which the curriculum is based on, and the skills identified for inclusion in the Tohoku University curriculum generally correlate well to higher TOEFL ITP® scores (Sakurai et al., 2021). We also conducted student surveys in an attempt to: (a) verify that the feedback encouraged some students to review their A1 and B1 skills, and (b) to glean information that could be useful in subsequent implementations of the FAs at Tohoku University.

In order to ensure the validity of the tests, Pearson's correlation analyses were conducted on the tests and both pre- and post-test TOEFL ITP® scores, repeated both for the overall scores as well as for the scores of the specific section with which the skills were designed to impact (i.e., the correlation between A1 tests and reading section scores, and the correlation between B1 tests and listening sections scores were also checked). Furthermore, we used a repeated MANOVA test of students' TOEFL ITP® test scores using their scores on the FAs to check whether or not proper skill acquirement in the first semester was correlated with greater improvement. Finally, we used an ANOVA test to check for differences in the

delta scores of students who took one, both, and neither of the FAs, with Tukey's HD for post-hoc analysis.

Survey responses were checked for signs that some students followed the suggestions in the feedback and worked to improve. Furthermore, we simply observed students' opinions on the test in general to gather suggestions for improvement.

Results

Scores Analysis

The correlation between the FAs and the TOEFL ITP® test scores are shown in Table 1. In general, it seems that the tests had moderate correlation to the TOEFL ITP® tests, meaning that the tests were likely at least somewhat representative of EGAP ability. Furthermore, the repeated MANOVA showed that higher scores on both the A1 FA and the B1 FA were significantly correlated with more improvement on the TOEFL ITP® test sections they were designed to aid ($p = .002$, $r = .04$ for the former, $p < .001$, $r = .28$ for the latter).

Table 1

Correlations (r) Between FAs and TOEFL ITP® Scores

Formative Assessment	Pre-test		Post-test	
	Overall Score	Section Score	Overall Score	Section Score
A1 FA	.391**	.294**	.391**	.358**
B1 FA	.575**	.518**	.586**	.544**

Note. The "section score" means the reading section for the A1 test and the listening section for the B1 test. *$p < .05$, **$p < .001$

The average amount of improvement for students who did and did not take the FAs is displayed in Figures 1 and 2 below. Our results showed significant differences between the groups; F [3, 2318] = 2.64, $p = .05$. Post hoc comparison showed that the only difference was

between students who took both formative assessments and those that took neither; $p < .001$. Furthermore, students who took the B1 FA showed more improvement on the listening section than those who did not ($p = .04$), and students who took the A1 FA improved on the reading section more than those who did not ($p = .05$).

Figure 1

Average Overall TOEFL ITP® Delta Scores per Group

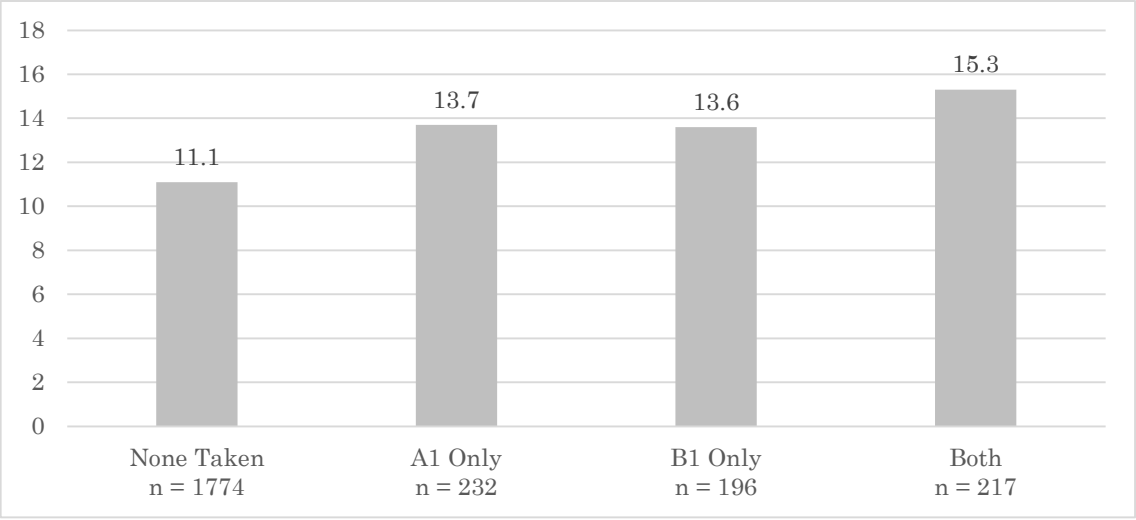
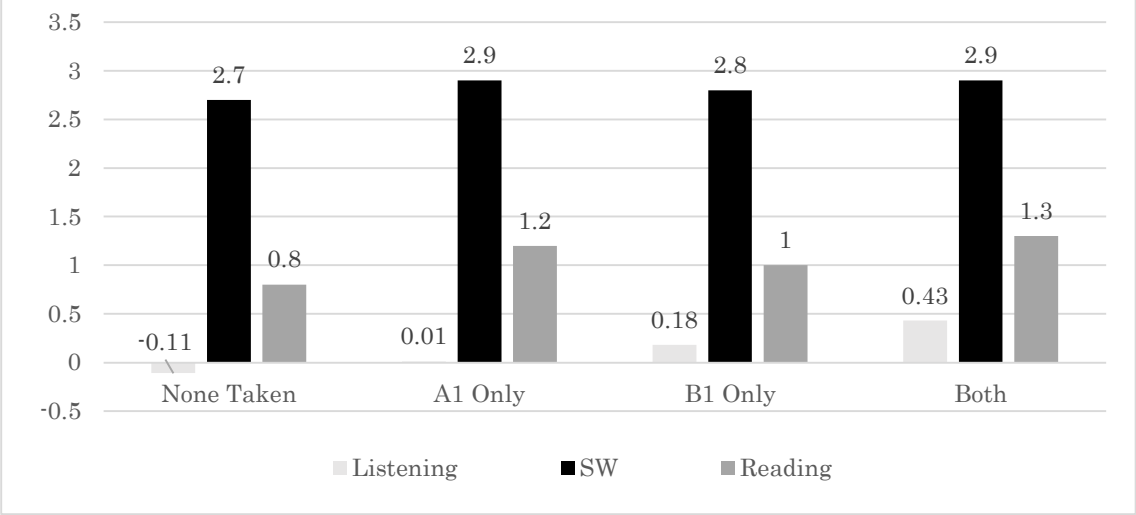


Figure 2

Average TOEFL ITP® Section Delta Scores per Group



Student Surveys

When students were provided feedback, they were also sent a link to an online survey that asked them to evaluate the difficulty of the FAs, the usefulness of the FA feedback, and their willingness to improve the skills that they were told needed improvement (according to the FA feedback). The majority of the questions were 5-point Likert scale questions (Questions 2, 3, 4, 6, 7, and 8), but two open-ended questions were also used to ask about the reason for participation and for general comments (Questions 1 and 5). A list of the exact questions can be found in Appendix A.

Participation in the survey was voluntary and only seventeen students answered. According to the answers to Question 1, most students took the FAs because they were assigned (75%) and some students (25%) took them voluntarily to review or check the knowledge and skills they learned in the previous semester. Regarding the difficulty of the FAs (Question 2), about half of the students (52.9%) chose a neutral answer and 35.3% of the students rated them as "difficult." Combined with the fact that the average percentage of correct answers on the FAs were 66.28% for the A1 FA and 59.01% for the B1 FA, and that the scores correlated to TOEFL ITP® scores in general, it seems that the level of the FAs was mostly appropriate, as they were neither overly difficult nor easy. One participant commented that it would be more helpful if students could see the FA questions and answers for review. Table 2 summarizes the results for the Likert scale questions (Questions 3, 4, 5, 7, and 8). The means in Questions 3 (3.65) and Question 4 (4.35) show that the students self-reported as very keen on improving their shortcomings indicated by the FA feedback. Additionally, they tend to think that taking the TOEFL ITP® test is effective in attaining EGAP skills.

Table 2

Survey Results

	Q3: The feedback was useful.	Q4: I want to improve based on the feedback.	Q6: Pathways skills are helpful for EGAP.	Q7: Pathways skills are helpful for TOEFL.	Q8: TOEFL is effective for EGAP.
M	3.65	4.35	3.59	3.35	4.06
SD	0.97	0.59	0.84	0.90	0.87

Discussion

Considering the results holistically, it seems that the FAs reported on in this study had a discernable impact on learning outcomes, i.e., TOEFL ITP® score improvement, albeit a low level of influence. While the tests and skills within them did seem to align with EGAP ability and mastering the skills does seem to relate to higher TOEFL ITP® scores in general, it seems that only a small amount of this is due to the FAs, specifically. While this is somewhat expected because the FAs are one small piece of a much larger curriculum, part of the reason the impact level is low could be partially due to the fact that some students may not have been learning ideally, i.e., properly acquiring skills during their first semester and practicing over the summer vacation so as not to lose them. However, another reason that the FAs had low levels of influence is also partially due to the feedback and lack of follow up, which should be addressed in the future.

The survey results, in combination with the statistical analysis, suggest that the FAs did encourage some students to adjust their learning strategies, but could stand to be improved in a number of ways, especially in terms of feedback. First, many students did indicate that they intended to work on the particular skills that the FA suggested they needed to review. In this sense, the feedback was effective in proving positive and encouraging comments that might have initiated self-reflective student learning. However, survey participants did indicate that they wanted the FA feedback to include not only their scores, but also the questions and answers so that the students can review them. We did not include this information to decrease the potential of threatening students' self-esteem, following Kluger and De Nisi (1996), but it

seems that students would have found this information an important and relevant way to review and learn from their mistakes. Furthermore, providing information regarding which questions they missed could be impactful in that it can help students to figure out their exact shortcomings, which would hopefully promote student learning. Therefore, we intend to include this information in addition to individualized feedback in future iterations of our FAs. Furthermore, though students indicated that they wanted to review based on the information they received from the FAs, based on the survey results, we should include monitored practice activities so that we can ensure continual progress, as suggested by Gardner (2012).

With regards to how well the FAs influenced teaching strategies, there is some evidence that the FAs contributed a small amount to the curriculum. Specifically, though the FAs were given on a voluntary basis and some teachers did not participate, some teachers reported adjusting their second semester classes based on the FA outcomes. Specifically, two A2 teachers added word parts self-study and weekly quizzes to their classes based on students scoring low on that skill in some of their classes, and one B2 teacher added review of phrasal verbs and idiomatic expressions to one class due to low scores from a particular class. Although Gardner (2012) argues that it is best for students to be personally responsible for achieving the learning outcomes and this is a point that should be considered in the future, the FAs did seem to help at least some of the teachers to encourage students to acquire the skills that they could not in their first semester.

Relatedly, another area in which the Tohoku University FAs need improvement is teacher outreach. Although several teachers gave their students the links for the FAs, the majority did not. Perhaps some teachers did not see the advantage to the FAs or did not want to be held responsible for reviewing material from the previous semester, but this is beyond the scope of this study and currently unclear. However, this issue should be addressed, as it could also be seen as unfair to students who would have like to have taken the FAs but were

not given the opportunity. In coming years, we hope to convince more teachers to consider FA scores and create a fairer system for providing students with links for the FAs.

Based on the above results and discussion, the question of whether or not the Tohoku University FAs are meaningful requires some personal interpretation. On the one hand, they caused a statistically significant impact on TOEFL ITP® scores, but on the other hand, the amount it seemed to help was quite small; a few points overall with a small effect size. Creating and administering the FAs was quite time consuming, and some might argue that the small impact is not worth the effort. However, we believe that anything that we can do that will help students even a little bit, or that will help even just a few students is meaningful. Furthermore, since we have confirmed that the FAs are helpful to at least some students, we feel that continuing to improve them to increase their impact is a worthwhile effort, and we will endeavor to do so based on the results of this study.

Conclusion

Based on the above results and discussion, we can conclude that the Tohoku University FAs were successful in their intended purpose of improving EGAP learning. Specifically, the TOEFL ITP® scores of learners who took the FAs improved more than their peers who did not, and the FAs improved the targeted skill areas of the TOEFL ITP® test that they were intended to. Furthermore, some students and teachers revised their teaching and learning strategies based on the results of the FAs, which likely helped students to achieve higher test scores. However, we did find that the impact of the FAs was quite minimal as only some teachers and students used them, and the effect size of the difference in scores was small, albeit statistically significant. Furthermore, we discovered several points for improvement to the FAs in the future: i.e., teacher outreach to ensure more students can take the FAs, including lists of questions and answers with results, and providing more specific and monitorable practice for areas that students had difficulty with. Overall, we feel that the FAs

were meaningful on a curriculum-wide scale and hope that we can increase their impact in the future.

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Appendices

Appendix A: Survey Questions Used in this Study (translated from Japanese)

Question 1: Why did you take the FAs? (open-ended)

Question 2: Choose only one item that best matches the difficulty of the FAs:

1. Very difficult, 2. Difficult, 3. Neither, 4. Easy, 5. Very easy

Question 3: I received useful information about my English proficiency by reading the FA feedback.

1. Strongly disagree, 2. Disagree, 3. Neither, 4. Agree, 5. Strongly agree

Question 4: I want to improve my English by working on my weak skills based on the FA feedback.

1. Strongly disagree, 2. Disagree, 3. Neither, 4. Agree, 5. Strongly agree

Question 5: Please write your comments or requests in detail about the FAs. (open-ended)

Question 6: The English skills in Pathways (the textbook for English classes, A1, A2, B1, and B2) are helpful in acquiring EGAP. (Example skills: Word Parts, Synonym Vocabulary, Skimming & Scanning, Note-taking while listening, Phrasal Verbs & Idiomatic Expressions, Collocations, and Tone of Voice)

1. Strongly disagree, 2. Disagree, 3. Neither, 4. Agree, 5. Strongly agree

Question 7: The English skills in Pathways (the textbook for English classes, A1, A2, B1, and B2) are helpful for the TOEFL® test. (Example skills: the same as Question 6)

1. Strongly disagree, 2. Disagree, 3. Neither, 4. Agree, 5. Strongly agree

Question 8: Taking the TOEFL ITP® test is effective in acquiring EGAP.

1. Strongly disagree, 2. Disagree, 3. Neither, 4. Agree, 5. Strongly agree

Submission Guidelines

JACET International Convention Selected Papers, Vol. 9

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Submission Deadline: 11:59 PM Japan Standard Time, November 1, 2022

Submission Form:

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2. A paper based on a plenary lecture may be submitted as an Invited Paper (by invitation only).

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2. All manuscripts must be written in English.

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   3.2 Use 12-point Times New Roman font.
   3.3 Leave margins of 2.5 cm on all sides of every page (A4 size, 210 mm × 297 mm or 8.27 in × 11.7 in). There are 26 lines to a page.
   3.4 Do not justify right margins.
   3.5 Do not use running heads.
   3.6 For anonymity in the peer review process, submit papers without the author name(s).
   3.7 Include the title, an abstract (no more than 200 words), and keywords (no more than five keywords; a multiple-word key phrase can be counted as one keyword).
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