Technology and Notetaking in English-Medium Instruction: A Case for Increased Attention

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Developments in technology have recently attracted interest from researchers investigating notetaking in first language (L1) contexts. Digital tools such as computers and presentation slides have impacted how students take notes in comparison to the traditional longhand method of using pen and paper. Technology-based practices, such as taking notes with computers, writing notes on handouts of lecture slides, and even taking photos of information instead of taking notes, have begun to play increasingly larger roles in English-medium instruction (EMI) in second language (L2) English contexts. However, the robust and expanding research agenda on notetaking and technology evident in L1 environments has yet to stimulate similar interest in L2 contexts. The present paper reviews relevant research on notetaking and technology from L1 contexts and argues the need for similar investigations in L2 contexts such as Japan, where increasing numbers of students are enrolled in EMI courses.

テクノロジーの進歩により、第一言語(L1)環境におけるノート取りの研究に関心が集まっている。これはコンピューターやパワーポイントなどのデジタルツールが、ペンと紙を使用する従来のノート取りの手法に変化を及ぼしているからである。コンピューターでノートを取る、講義スライドの配布物にメモを書く、ノートを取る代わりに写真を撮るなど、デジタル技術は英語を第二言語(L2)とする環境における英語で教える(EMI)授業において、ますます大きな役割を担うようになってきている。しかし、L1環境におけるノート取りとテクノロジーに関する研究に比べるとL2環境における研究はまだまだ限定的である。本論はL1環境におけるノート取りとテクノロジーに関する研究の先行文献調査の後に、日本のようなEMIの授業を履修する学生が増加しているL2環境においても同様の調査研究を行う必要性があることを主張する。

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Students in higher education face an overload of information from required readings, online sources, and lectures. To help them manage and learn from these sources of input, many students elect to take notes—a process that is generally thought to be beneficial in academic contexts. Notetaking becomes especially important when students are learning content delivered in a second language (L2), such as English-medium instruction (EMI) contexts, which have been rapidly increasing around the world. For example, in 2019, the Ministry of Education, Culture, Sports, Science and Technology—Japan (MEXT)reported that the number of domestic institutions offering degree programs in English nearly doubled from 2005 to 2015. When attending lectures, participating in seminars, and reading course literature in an L2, students in these EMI courses are likely faced with information processing challenges that are more intense than would be the case in their first languages.

Regardless of language of instruction, an essential tool for effectively managing, organizing, and making sense of course material is notetaking (see Crawford, 2016, for a review and discussion of relevant research with links to the Japanese context). During lectures, students must listen to and understand the content, decide what to take note of and how, and then physically transcribe it, all in rapid succession while continuing to pay attention for new important information. To help students succeed in notetaking that facilitates learning and stimulates accurate and meaningful recall of lecture content, digital tools offer potential support in terms of speed, efficiency, and convenience. Using laptops to type notes is one obvious example of the impact technology has had on notetaking practice. Another digital strategy aimed at increasing student learning involves teachers providing printed slide handouts prior to lectures, which students can use to write notes on. Teachers of EMI courses in Japan may wish to include strategies for effectively utilizing such technology in notetaking instruction alongside traditional longhand notetaking. In fact, the same can be said for teachers of English for academic purposes (EAP). Here, EAP refers to courses that prioritize academic use of English as an L2, such as high school or bridge courses, where L2 English proficiency is developed and assessed, while EMI refers to university courses where content rather than language use is in focus.

In first language (L1) contexts, the number of studies on how technology affects notetaking performance has been increasing in recent years.

Such research has compared the quality, quantity, and usefulness of notetaking via digital tools such as laptops and tablets as opposed to traditional pen and paper notetaking (PPN). Instructor-provided slide handouts may also influence how students take notes in comparison to how they do with free form notes (i.e., blank or lined paper without images of slides). While these issues have begun to receive attention in L1 contexts, greater attention is still needed in L2 contexts, where an increasing number of L2 English users are learning in EMI contexts. In EMI, students face listening, learning, and notetaking challenges distinct from those in L1 contexts. As such, research findings from L1 contexts are insufficient to address issues related to how L2 English users take notes in EMI. Such studies can be built upon and integrated into a new avenue of digital notetaking research set exclusively within L2 EMI contexts. To delineate the gap between attention to notetaking in L1 vs. L2 contexts, the present paper begins by summarizing recent L1 digital notetaking studies and highlighting the need for similar explorations of technology's impact on L2 notetaking. Throughout the paper, arguments are put forth with the aim of encouraging further research aimed at notetaking in EMI, which should be of interest to Japanese EAP students preparing for learning in EMI as well as instructors already teaching such courses.

On Notetaking: Emerging Digital Options

The Recording and Storage of Information

Notetaking serves two main theoretical functions related to learning: the encoding function, or the immediate act of writing/typing the notes, and the storage function, which allows the noted information to be accessed at a later time (DiVesta & Gray, 1972). Both of these functions are relevant for research into the effects of digital tools on notetaking in EAP and EMI, particularly in a context like Japan, where technology is so prevalent in everyday life. Precisely how notes are taken under certain methodological and formatting conditions is a matter of encoding. A key question is how these variables influence the quality and quantity of the notes taken.

The storage effect is also important. Questions that have received scant attention thus far in L2 contexts include whether and how students interact with their notes after taking them and whether notetaking method (i.e., longhand or digital) plays a role in such usage. These issues have been attracting attention in L1 research literature and deserve similar notice in L2 contexts, particularly because of the challenges faced by the growing numbers of students in EAP and EMI courses.

Tools and Technologies for Taking Notes

For recording information, notetakers have a variety of options. Although notes have traditionally been taken by hand on paper using pencils and other writing implements (e.g., colored pens or highlighters), other options (e.g., laptop computers, tablets, electronic pencils, and notetaking apps) have also become available in recent years. Moreover, compared to traditional PPN, these digital options offer potential advantages in terms of convenience, speed, and integration of multimedia during the notetaking process, as well as additional security of storage. The increasing frequency of technology use in L1 contexts has prompted research interest and stimulated studies focused on various manifestations of computerized notetaking (CN) (e.g., via laptops, tablets, and even smartphones). However, it remains unclear whether one tool or technology is better than others.

In terms of notetaking method (e.g., PPN or CN), several recent studies have compared the quantity of notes and their contributions to learning in L1. As Morehead, Dunlosky, Rawson, et al.'s (2019) survey of US students (n = 577) reported a majority using PPN (86%) and nearly half also using CN (46%), such studies appear to be warranted. Mueller and Oppenheimer (2014) were among the first to compare the notes and comprehension test results of PPN and CN groups. Their findings suggest that CN and the temptation to type the speaker's output verbatim may lead to shallower processing of input and learning than does PPN. In a replication of Mueller and Oppenheimer's (2014) study, Morehead, Dunlosky, and Rawson (2019) failed to reproduce the original findings and found that notetaking method had no impact on test scores. They also included a tablet computer group to allow comparisons between three methods (i.e., PPN, CN, and e-Writers). The findings showed that the quantity of words in notes was greatest for the CN group and similar for the PPN and e-Writer tablet groups. Luo et al. (2018) also compared PPN and CN notetaking and found that laptop notetakers recorded more notes (i.e., idea units and individual words) than their longhand counterparts, and that longhand notetakers recorded more visual notes (i.e., images). Despite the growing body of research, no clear evidence has been provided to date on whether smaller yet denser notes are more effective for learning than are larger quantities of notes that may contain less meaningful information. Such inconsistent findings have led Morehead, Dunlosky, and Rawson (2019) to conclude that "the available evidence does not provide a definitive answer to [whether longhand, laptop or tablet notetaking is preferable]" (p. 773).

As pointed out by Siegel (2020), much research on the use of technology for notetaking in L1 contexts has failed to raise similar questions in L2 contexts, where a traditional view of notetaking as PPN is more common; for example, longhand notetaking remains prevalent in EAP textbooks that focus on listening to lectures and notetaking in order to prepare students for EMI. While more research is clearly needed in L1 contexts, these questions should also be getting research attention in EAP and EMI since they are crucial to student learning, especially when comprehension levels in EMI lectures are likely lower than are those in L1 contexts. Moreover, the range of L2 abilities among students and teachers in EMI can further complicate teaching and learning. On the one hand, students require receptive L2 abilities to process incoming input, after which they need to produce notes through writing or typing (often in the L2). On the other hand, EMI teachers can impact notetaking through their spoken delivery (e.g., rate of speech, articulation, pausing patterns, and accent) and through pedagogical skills (e.g., giving a clearly organized lecture and providing accessible examples). Having access to and analyzing student notes taken via these various methods can provide valuable insights that can inform student practice, preparations in EAP courses, and the delivery of EMI lecture material.

Options for Structuring Notes

Notes can be taken in a number of different ways, but a main distinction is whether the notes are structured (in some systematic way) or unstructured. Structured notes have typically been associated with PPN. Common structures include the outline format, the Cornell method, and the use of bullet points. Some computer word processing programs also allow for formats such as outlines and bullet points, but they are less accommodating of more complicated formats (e.g., the Cornell method or mind-maps). The findings of Morehead, Dunlosky, Rawson, Blasiman and Hollis's (2019) survey of L1 students indicate that the linear, top-to-bottom, sequential nature of bullet points and/or the outline format, along with indentation features to indicate the significance and relationships between information (i.e., the main idea–supporting detail–example relationship) remains the preferred and most commonly used organizational style. However, the practice of distributing lecture slides, either in paper or digital (i.e., soft) format, may disrupt this structural preference in terms of spatial layout (i.e., the multiple square shapes on the page; see Figure 1 below) and decision making. By deciding what information is important enough to include on the slides, the lecturer is effectively depriving students of that valuable cognitive activity. As such, the optimal structuring of digital notes remains uncertain.

Providing Slide Handouts

When given copies of slides, students typically write notes on them. Printed slides are likely intended to provide structured support for lecture comprehension and notetaking; however, student effectiveness in doing so has not been empirically investigated in EMI contexts. When students are given freedom to take notes on blank paper, they can select one of many methods (i.e., use free form; see Figure 2). However, when they are provided partial slides (i.e., those that contain some, but likely not all, of the information they need to learn from a lecture), their notetaking performance is likely to differ. Furthermore, the timing of making slides accessible to students (i.e., before or after the lecture) is another related area that has received attention in L1 contexts (e.g., León & García-Martínez, 2021).

Figure 1

Illustration of Slide-Based Handout to Support Comprehension and Notetaking

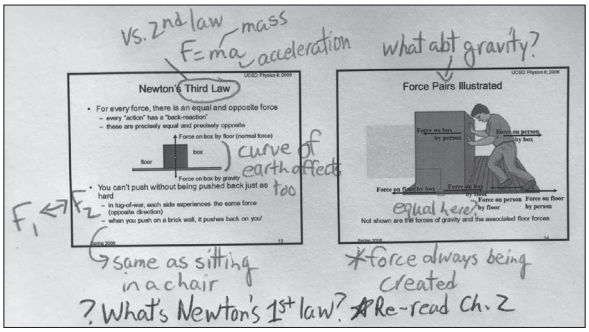
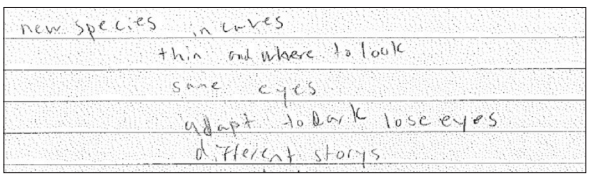


Figure 2

Illustration of Free-Form Notes



Another question to consider is whether instructors are justified in providing students with slides at all. That is, does this practice actually aid student learning and performance? According to Worthington and Levasseur's (2015) study at L1 universities, providing students with slides has an

adverse effect on course performance. Students who received slides performed worse on exam questions than those who did not receive slides. This finding was consistent for both complete slides (i.e., those with all necessary information) and partial slides (i.e., those on which the teacher has purposefully omitted certain information). Marsh and Sink (2010) found that providing access to handouts prior to L1 lectures led to less notetaking but better overall test performance. In a more recent study by Kim (2018), free-form notetakers outperformed those with access to full or partial slides. Notetaking research from L2 contexts seems limited to structures traditionally associated with PPN, such as the Cornell method and the outline format (e.g., Crawford, 2015; Siegel, 2016), and it has yet to address how slide handouts can affect notetaking in classes where English is used as an L2.

A Need for Studies on Technology and Notetaking in EAP and EMI

In a review of recent work on the topic (Siegel, 2020), only Debopriyo et al.'s (2014) study on notetaking apps used in L2 contexts focused on some aspect of digital notetaking. Thus, it seems that the valuable work conducted in L1 contexts has yet to spark similar interest and research agendas in L2 EAP and EMI. Technology and education journals such as *Computer Assisted Language Learning* (CALL) and *Computers & Education*, along with those focused on academic English more generally, such as *The Journal of English Medium Instruction*, are relevant outlets. Important areas of potential investigation include how PPN and CN are utilized by Japanese EAP and EMI students and what roles slides play in lecture notetaking. Decisions about what methods students use to take notes and how they do so (e.g., via translanguaging, paraphrasing, or abbreviation) are likely influenced by digital tools, and these topics need to be better understood in order to provide appropriate support to the many EAP and EMI students and teachers who engage in notetaking and notetaking instruction, respectively. The ways in which EMI learning and notetaking have been affected by online teaching via Zoom (and similar systems) are other areas in need of prompt attention. Not only has notetaking in EMI been underappreciated as a research avenue that can offer valuable insights related to applied educational psychology, lecture comprehension, and notetaking behavior, but technological aspects have also been largely omitted from research conducted on notetaking in L2 contexts. It is hoped that the attempt made here to raise awareness of the current situation will provide impetus for additional attention in this area.

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[JALT PRAXIS] TLT INTERVIEWS

Torrin Shimono & James Nobis

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Welcome to the March/April edition of TLT Interviews. For this issue, we bring you an interview with Tomoko Yashima, who is a Professor of Applied Linguistics and Intercultural Communication at Kansai University. Her main research interests comprise three broad areas: 1) communication behaviors, 2) second language use in intercultural contact situations, and 3) motivation and affect in second language learning. She has published extensively on the topics of willingness to communicate (WTC) and international posture (IP), and her IP scale has become the standard used in IP-related research by scholars across the globe. Currently, she is exploring qualitative research methods in order to conduct humanistic empirical research that leads to an understanding of people embedded in their living contexts. She was interviewed by Ian Willey, who is an associate professor of English at Kagawa University. He is currently heading a MEXT-funded research project to explore ways to increase university students' IP. His research interests include second language writing, English for Specific Purposes, and classroom medium of instruction. Now, without further ado, to the interview!

Revisiting international posture: An Interview with Tomoko Yashima

Ian Willey

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Using psychometric scales to assess individual differences in language learning has been common since the end of the twentieth century. One of the best-known scales is the willingness to communicate (WTC) scale, developed in the field of first-language communication and later extended to second language (L2) learning in the works of MacIntyre and Doucette (2010). WTC is determined by one's perceived communicative competence in an L2 as well as L2 communication anxiety. Raising learners' WTC is now considered integral to learning an L2. Related to WTC is the construct of international posture (IP), developed by Tomoko Yashima about twenty years ago.

Dr. Yashima, a pioneer in WTC research, has previously spoken about IP in the pages of *The Language*