



Impact of e-Technologies on Chinese Literacy Programs for College Second Language Learners

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Abstract

This study investigates the impact of the introduction of hypertext utilizing electronic dictionaries in a Chinese as a Second Language program for intermediate level students at a Western university. It seeks to build on earlier frameworks concerning the impact of electronic glosses and dictionaries in promoting greater learner autonomy in intermediate L2 programs. During two project trials, questionnaires and focus groups were employed to solicit information about the students' take-up of the new technology, their preferred learning styles, and their perceptions of the value of the e-learning tools and materials. The survey results indicate a relatively high level of take-up of the new technologies. Learners had a positive perception of the usefulness of these tools in assisting with class preparation, in promoting easier and more rapid reading, and in reducing learner fatigue. While learners found the use of electronic dictionaries to be beneficial for exploratory reading, there was also a preference for curated glossaries to complement their learning. Ongoing training and assistance were necessary to avoid a 'digital divide' in the take-up of e-technologies.

1 Introduction: Pedagogical issues in teaching written Chinese

The Chinese language presents a number of difficult challenges for the Western language learner. Chief among these is the non-alphabet orthography with the necessity to memorise several thousand unique characters. In order to acquire vocabulary, the student must learn the tonal pronunciation of a word together with its corresponding Chinese character(s). Chinese characters offer only modest indications of the possible sound in Mandarin and do not transparently convey meaning. Another problem is that Chinese orthography does not use space to distinguish the boundaries between words (DeFrancis, 1984; Walls & Walls, 2009). The learner thus needs to identify which characters in a text refer to single-syllable words and which belong to multi-syllabic words. Learning fatigue becomes more acute as students transition from elementary classes based around conversation to curriculum involving extended prose written in a more formal register. Chinese language instructors distinguish between the *kouyu* (口语) or conversation classes offered at an elementary level (usually the first two years of a typical program in the West) and the *shumian yu* (书面语), that is, 'bookish' or more formal language introduced in third and higher years in newspaper and literature classes.

L2 Chinese classes at an intermediate level have traditionally relied on printed material with customised glosses to assist student with reading extended prose in *shumian* discourse. In the absence of ready-made material, teachers could often spend long periods in preparing customised glosses for selected texts. In turn, students would spend many hours toiling over texts with large numbers of unknown or unremembered characters. Student progress would be constrained by the time taken to look up Chinese characters in a conventional print dictionary. In traditional practice, an original prose text would be taught primarily by teacher explication and translation. This continual reliance on instructor-prepared glosses and teacher explanation has had the effect of inhibiting students' exploration of new material beyond the curriculum. For example, on completion of a three-year *ab initio* program in Chinese, it would be the rare graduate who would feel confident about reading original Chinese material on their own without the benefit of gloss or teacher explication. In this study, learners were provided with literary materials and encouraged to develop skills using e-technologies to allow them to gain a measure of competence in independent reading. An important goal was to investigate the extent to which electronic hypertext could assist students' independent reading and thus influence their perceptions of their learning.

2 Review of literature on the use of hypertext in the L2 classroom

The key online learning tool investigated in this study was the use of a pop-up Chinese electronic dictionary to facilitate the reading comprehension of authentic or slightly rewritten texts. For this reason, it is necessary to discuss previous research into the relative efficacy of providing glosses or hypertext in language learning courses for the second language learner in a Western setting.¹ A key issue in research over the last two decades has been the relative efficacy of computer-mediated glosses as opposed to traditional methodologies. Knight (1994) demonstrated that students in a US Spanish class who had the opportunity to use a software dictionary in a computer laboratory learned more words and gained higher scores in a comprehension test than those who had sought to infer the meaning of vocabulary in context without the benefit of a gloss. In their overview of a number of studies on hypertext in reading environments, Ariew, Erçetin and Cooledge (2008) found that the effectiveness of glosses in improving reader comprehension related to the prior experience of the learner, the level of the class, and the verbal ability of the learner. Hypertext was found to be most beneficial to learners at a low or intermediate level and less helpful to advanced learners, where it can sometimes impede a more holistic comprehension of a text (see also Ariew & Erçetin, 2004). One perceived advantage of hypertext is that it allows the reader to exercise a level of active choice in choosing assistance with comprehension. It is theorised that the reader is encouraged to be proactive in using the hypertext as required to navigate through an unfamiliar text. In this way, reading with invisible hypertext available with a mouse click can induce a mode of "attentive reading" that leads to improved outcomes in reading comprehension and the acquisition of new vocabulary (Ariew et al. 2008, p. 50).

Another positive benefit of hypertext is the 'incidental' learning of vocabulary, that is, when a student comes to understand a word or expression while undertaking a task involving reading comprehension. In this case, "students do not need to make a conscious effort to learn new words but vocabulary acquisition is a by-product of accomplishing some other task" (Erçetin & Cooledge, 2008, p. 50). Unlike traditional glosses, which are visible on the printed page, an online dictionary requires a student to deliberately look up the meaning of a word. Abraham (2008) conducted a meta-analysis of 11 empirical studies of computer-mediated glosses and noted strongly positive impact on the learning of incidental vocabulary. However, he also found that hypertext was less effective for beginner learners than for intermediate and advanced groups. Zandieh and Jafarigohar (2012) investigated the type of conditions that facilitated either incidental or intentional learning in a class of L2 English learners. It was found that 'intentional' use of a hypertext gloss facilitated immediate vocabulary acquisition but that 'incidental' use of a hypertext tended to facilitate longer term retention.

Lenders (2008) investigated the use of electronic glossing in a program of English for Academic Purposes and found comprehension benefits in the reading of authentic texts. However, longer

term retention of glossed material was often disappointing. It was found that retention of learned material could be improved if glosses were accompanied by a focused reading task (Lenders, 2008). Lee-Thompson (2008) reported on the use of printed glosses by intermediate level Chinese L2 college students. In this case study, learners overwhelmingly used glosses to engage in 'bottom-up strategies' to understand the text, that is, identifying word boundaries, translating unfamiliar words and vocalizing the text to improve comprehension. They were far less likely to use the glosses to engage in more holistic or summative comprehension of the text ('top-down strategies'). As Ariew and Erçetin (2004) have noted, reading in a hypermedia environment should be regarded as a specific skill that needs to be integrated into the teaching program so that students are encouraged to use both 'bottom-up' and 'top-down' strategies.

Researchers have also considered the relative density of hypermedia with regard to impact on learner comprehension. Hypermedia can range from simple definitions to a rich hypertext of audio, pictures and videos (AbuSeileek, 2008, 2011; Chen, 2014; Chen & Yen, 2013; Chun & Plass, 1996; Lenders, 2008). Chun and Plass (1996) examined the use of multiple media annotation in the acquisition of vocabulary in the case of German. They found that in cases where students of German had access to annotations as text, pictures and video they were more likely to enhance their incidental acquisition of vocabulary. Further, they found that annotations of picture plus text were more effective in language learning than video plus text. On the other hand, the provision of large amounts of hypertext or graphic and video material can also be associated with cognitive overload and redundancy. It can distract the focus of the student and impede speedy comprehension. They concluded that different modes of learning work better with different sorts of learners: "There is no one mode or medium that is helpful to all learners" (Chun & Plass, 1996, p. 195). Some students preferred definitions, others prefer visual material, in line with their particular "cognitive style" (Chun & Plass, 1996, p. 195). Lomicka (1998) produced an influential study on the impact of glosses on student reading comprehension in a French class. Her student participants were divided into three groups: those with no access to glosses, those with computer glosses limited to French definitions and English translation, and those with rich multimedia glosses including cultural references. Students were tracked by software to record their preference for particular categories of glosses. She found that students with access to the full multimedia glossary reached a higher standard of reading comprehension. However, even those with access to the full glossary preferred to draw predominantly from the English language translations (Lomicka, 1998). This finding that video hypermedia could distract the learner from attentive reading has also been confirmed in the study by Airew and Erçetin (2004).

Studies have also addressed the relative efficacy of different types of glosses, ranging from in-text or embedded glosses (where a definition is provided next to the word), marginal glosses (on the margins of the page), end of text glosses and invisible pop-up glosses (AbuSeileek, 2008, 2011; Chen, 2014; Chen & Yen, 2013). Chen and Yen (2013), in their investigation of an English as second language class in Taiwan, found that learners who used pop-up hypermedia had the best performance in comprehension tests, but a follow-up study found that assessment of comprehension varied with the assessment instruments (Chen, 2014). Results of studies on gloss formats are somewhat inconclusive. Important variables include the prior experience and proficiency level of the learner and the types of comprehension assessment employed. Chen and Yen (2013) found that in general higher proficiency participants were able to make much more effective use of pop-up hypertext than lower proficiency participants (Chen & Yen, 2013). According to Chen (2014), the pop-up hypermedia worked best for the "pro-active reader" whereas in-text glosses were most beneficial to "the reluctant reader or the reader of limited proficiency" (p. 9).

Research into the use of hypertext in L2 environments has also found that learners can gain a heightened sense of autonomy through the use of hypertext and thus experience enhanced enjoyment of the curriculum (Erçetin, 2003; Cooledge, 2004; Lenders, 2008; Nely, 2011; Son, 2003). Cooledge's dissertation (2004) demonstrated the positive effects of English language hypertext on student motivation in French teaching at an intermediate level in an American university. Gloss or hypertext has been found to promote a stronger sense of independence amongst participants. Son (2003) notes that, in the case of a Korean language class in Australia, the introduction of a custom-

ised gloss in a computer-assisted program had facilitated “a discovery approach” in student learning (p. 107). Son (2003) concluded that “hypertext seems to have considerable potential for enhancing self-management of learning and contributing to individual reading development” (p. 108). Erçetin (2003) observed that intermediate level students made greater use of hypermedia annotations than more advanced groups but that both groups found reading with hypertext a more enjoyable experience. Nely (2011) surveyed a number of empirical studies on the impact of hypertext e-text on reading comprehension in the case of English as a Second Language. The key finding was that a majority of students reported positively on the benefit of hypertext language materials in comprehending language material.

In recent years, Chinese has become a more widely-taught language and a number of e-technologies to assist the L2 learner have emerged from commercial and educational sectors (see below). However, relatively little work has been done on the impact of these new digital tools on students’ perceptions of their learning and student motivation. Wang (2011) investigated the use of an e-dictionary called NJ Star on 20 intermediate and advanced learners of Chinese in the US. NJ Star requires the student to cut and paste a portion of text into a dialogue box and then pass the cursor over the required characters. It was found that the outcome was most beneficial for the intermediate level learners, and in fact, the use of the e-dictionary “effectively closed the vocabulary knowledge gap between intermediate and advanced students” (Wang, 2011, p. 483). Wang and Upton (2012) investigated the impact of using a freely accessible online pop-up dictionary in a small class of beginners’ Chinese. They reported that the use of the pop-up dictionary significantly improved the students’ ability to identify word meanings and to master the pronunciation of new characters. The online tool used in this study (Chinese Tools), as with NJ Star used in the previous study, required students to cut and paste the Chinese text into a dialogue box and then employ the pop-up tools to annotate the text. It was found that students with access to this electronic tool showed stronger comprehension than the control group who did not have this access. The electronic dictionary was particularly useful for identifying word boundaries in Chinese discourse. Nonetheless, the provision of multiple definitions and superfluous data could also lead to learner errors of interpretation. Wang and Upton (2012) suggest that the optimal procedure for the use of electronic annotation tools would be a three-stage process of reading the required text. First, the learner should read without the pop-up dictionary to try to get the gist of the text, then a second time with the assistance of the pop-up dictionary and, finally, a third time with minimal use of the pop-up dictionary (Wang & Upton, 2012, p. 39). Since the work of Wang and Upton (2012), more sophisticated Chinese electronic dictionaries have appeared. The present study investigates the impact of these newer forms of electronic dictionaries in the L2 classroom.

3 E-learning tools and student motivation

3.1 Research questions

This study investigates the impact of the introduction of e-learning tools on student motivation in the case of the Chinese L2 learner, with a particular focus on the use of hypermedia electronic dictionaries on mobile platforms. This technology offers a distinctive advantage over earlier forms such as NJ Star and Chinese Tools that require students to cut and paste a section of discourse into a dialogue box in order to employ the annotation tool. With a downloaded Chinese electronic dictionary, the language learner can now read any section of Chinese discourse in an online medium by simply touching with a finger or placing the mouse over unfamiliar characters to gain information about its meaning (often in multiple dictionaries) and its pronunciation (in *pinyin*, Romanised Chinese with tones, and vocalization for male and female voices). Whole portions of discourse can be heard read aloud using the online audio clips. The new technology greatly facilitates the reading of Chinese language online texts on mobile platforms such as iPads, iTablets and smart phones. It represents a significant technological advance over earlier electronic dictionaries in Chinese and offers considerably more convenience to the L2 language learner. Compared with

earlier technologies such as NJ Star and Chinese Tools, the new hypermedia dictionaries offer greater opportunities for learner use of e-dictionaries in a classroom context.

In this study, L2 Chinese learners in the third year (typically regarded as ‘intermediate’ in the case of the L2 learner of Chinese in the West) were provided with authentic or slightly rewritten literary materials in an online medium and encouraged to read these with the aid of Chinese electronic dictionaries. Participation in this form of online learning was voluntary but strongly encouraged. Previous research has found that glosses or hypertext tends to be particularly effective in the case of intermediate students of Chinese and can promote greater learner autonomy (Abraham, 2008; Chen & Yen, 2013; Erçetin, 2003; Wang, 2011). An important goal of this study was to investigate the impact of electronic hypertext in assisting intermediate-level learners to engage in a more proactive fashion in their own learning. It was hypothesized that the provision of online readings with a pop-up electronic dictionary could promote greater engagement with the learning process, enhance student motivation, and help to reduce learner frustration with regard to vocabulary acquisition and reading comprehension.

This study sought to explore student perceptions of the use of newly-emerging hypermedia dictionaries in developing their Chinese literacy skills. This is possibly the first study to investigate the use of Pleco or similar hypermedia dictionaries in an L2 literacy program. For this reason, the survey instrument contained a number of open-ended questions involving students’ perceptions. Focus groups (as outlined below) were used to further clarify learner responses. In addition to this exploratory aspect, the project also sought to confirm the hypothesis, posited by many earlier studies, that the use of glosses or hypermedia explanations were of significant benefit to the intermediate L2 language learner.

The initial trial, conducted over one semester in 2013, was repeated in 2014. However, the size of the sample (a total of 39) was relatively small. For this reason, this study is largely exploratory in nature and will need to be tested by further research.

The main research questions were as follows:

1. In conditions where the instructors provided online learning tools to aid reading comprehension, to what extent would learners choose to utilise these tools?
2. For participants who availed themselves of the new technologies, what were their preferred learning styles?
3. What were participants’ perceptions of the efficacy of these online learning tools in their learning?

3.2 New developments in e-technologies for learning Chinese

In recent years, there have been a number of new developments in the provision of online tools for assistance with Chinese character acquisition and reader comprehension. These emerging commercially-available e-technologies offer new opportunities to empower the student to read original cultural texts with significantly less frustration than by using a print dictionary. It also makes it possible for a learner to read downloaded texts with an iPad or smart phone. These electronic dictionaries contain multiple features of value to the L2 Chinese learner, including a tool to assist with learning stroke order in writing characters, pronunciation guide in *pinyin* for individual characters, and audio clips in male and female voices. The learner can also create personalised electronic flash cards that could be downloaded to a smart phone or other device and used to acquire new vocabulary through spaced repetition systems (SRS). A recent pilot study on the use of SRS systems in the case of Chinese character acquisition reported a positive effect on performance (De la Rouviere, 2013). These new e-technologies mark a significant advance on the sorts of digital tools explored in the studies of Wang (2011) as well as Wang and Upton (2012), which relied on cumbersome cut-and-paste methods to access online annotations.

A number of learners of Chinese have begun to avail themselves of the new technologies, some of which are either free or available at a modest cost. These applications include Pleco, MDBG, KTDict for iPhone, Mandarin Tools, HanPing and NCIKU.² However, these new applications

have only rarely been encouraged or adopted in the Western classroom and the efficacy of these methods for the L2 Chinese learner are as yet largely unexplored. In this project, learners of intermediate level Chinese were encouraged to download the free version or the basic package of Pleco, which is one of the most widely used mobile applications for Chinese language learning. Pleco was chosen because it offers a basic package for free and is convenient to use on a mobile platform. It also offers more functions than its competitors, including training in stroke order, audio clips to read text out loud and electronic flashcards. For these reasons, Pleco can be used with benefit by both beginner and advanced students. It is licensed to use a range of dictionaries, such as the *Oxford Chinese Dictionary*, *ABC Chinese-English Dictionary*, *Tuttle Learner's Chinese-English Dictionary*, and Chinese-Chinese dictionaries. For a broader range of dictionaries and pronunciation aids, it is necessary to purchase add-ons at a modest cost.

3.3 *Trial project in a Chinese L2 literacy subject*

This study reports on a trial project first conducted in 2013 to offer Chinese literary materials in an online format to a group of intermediate L2 learners. The trial involved the introduction of new e-technologies to the instructors and students, ongoing training and assistance to learners, and qualitative research through a questionnaire and focus groups to investigate learner take-up of the new technologies, the extent of learner use of new e-learning methodologies and their perceptions of its efficacy. The trial was replicated with some modifications in the first half of 2014. The outcomes from both trials will be presented here.

In late 2012, a focus group discussion was held with student volunteers to discuss current use of Chinese digital tools. This demonstrated there was already a strong interest in the use of digital applications for Chinese language learning and that many students were using a range of electronic dictionaries or translation tools, such as Google Translation. In line with student suggestions, it was decided to provide information about available Chinese e-technologies, including the relative advantages of different sorts of applications, and advice on which ones were more suitable for iOS and Android platforms.

After an investigation of available digital tools for Chinese L2 learners, it was decided to encourage intermediate-level students to read authentic material online with the use of electronic hypertext. Pleco was the recommended electronic dictionary, although students could also avail themselves of other online dictionary tools. In the first half of 2013, online materials and technologies were incorporated into a semester-long subject dedicated to the teaching of modern Chinese literature. This subject was designed for L2 *ab initio* learners of Chinese in their third year or for L2 post Year 12 (non-background) learners in their second year. The students would have had prior experience of from 800 to 1,000 Chinese characters. In the 1st semester of 2013, 30 students were enrolled in this subject. This comprised approximately even numbers of males and females. The students had completed two years or equivalent of Chinese language learning from beginning stage. They had no or very limited experience in reading authentic materials in Chinese. A set of resources was developed, comprising novel extracts, stories, poems and transcripts of interviews with Chinese authors. The material was converted from Word docs and printed material into editable formats via Optical Character Recognition (OCR) technology using the commercial software, Abbyy FineReader II.³ It was saved in HTML format and presented using a web service embedded within the University's chosen online learning platform, the Learning Management System (LMS). A weekly course schedule was set up on the subject website with clickable links through to the electronic texts for each week. Once the material was downloaded, it could be read offline without accessing the Internet. In addition, a set of online exercises was prepared by the instructor in Word documents and then imported into Respondus, which is a survey/exam add-on available in Blackboard LMS. The material comprised English-Chinese matching translation exercises and cloze exercises. Respondus allowed for automatic feedback on the right/wrong answers.

The students were introduced to the digital material in Week 1 of the semester, particularly the online course reader offered within the subject website. In addition, the use of Pleco (the recommended online dictionary application) was demonstrated using a lecture video camera. A print

copy of the Course Reader was also available for student purchase. The students were told that the use of the digital resources was voluntary but were encouraged to adopt the new technologies. They were informed that the curriculum provides for a three stage learning process, specifically, pre-class preparation using an electronic dictionary to read the required language material, in-class activities to clarify and consolidate comprehension of the text, and post-class revision and testing of learned material through the medium of online exercises with automatic right-wrong feedback. In 2013, students were told that completion of the online exercises was voluntary. However, in 2014, to encourage more participation, students were informed that completion of three-quarters of the online exercises was a threshold requirement for the course, although no grades were to be awarded. Analytics in the LMS allowed for scrutiny of exercise completion by individual students. As well as the above required activities, a range of other tools were offered on a voluntary basis. For example, students who wished could generate their own electronic flashcards, which could be downloaded to a mobile device such as a smart phone. This allowed for the learning of new vocabulary in spaced repetition mode.

Providing information and technical assistance to students was a crucial aspect of the project. A Chinese Learning Resource Wiki was set up in the LMS and made accessible to all students and teachers in all Chinese language subjects taught at the university. The Resource Wiki was populated with a range of resources such as explanations about Chinese input methods, different Chinese fonts, how to type in *pinyin*, and how to download browser add-ons to facilitate reading Chinese text. The Resource Wiki also offered hyperlinks to online learning material for students at each stage of the program, from beginners through to advanced, and to selected educational sites dedicated to Chinese language, politics, society and culture. The objective here was to provide interesting enrichment material for those students who wished to get further information about digital aids or to expand their knowledge of Chinese society and culture.

Since the course reader was also available in print, students in this subject could choose to rely solely on the print course reader, with its customised gloss, or to avail themselves of the digital course reader, which provided generic rather than customised definitions. Many students ventured online to read the set texts with electronic dictionaries, which provided global definitions, and then sought clarification of their comprehension by checking out the customised glosses in the print course reader. The latter, however, provided definitions for only a limited number of Chinese characters.

A follow-up meeting was held at mid-semester to elicit student responses to the learning innovations and assist with any technical difficulties. Near the end of the semester, a questionnaire was distributed to students together with a consent form and plain language statement, in line with requirements of the University's policy on Human Research Ethics. The survey instrument (see Table 1) was developed on the basis of questionnaire material available in the University Learning Management System and refined in line with insights gained from the student focus groups mentioned earlier about students' actual use of new e-technologies. The survey instrument contained questions designed to elicit quantitative data (take-up and pattern of usage, preferred platform, and so on) and also qualitative data (open-ended questions designed to explore how learners used the e-technologies made available to them). The results of the survey will be discussed later in this study.

From the students' perspective, the most useful of the above resources was the provision of the online course reader with the facility to download Chinese e-dictionaries to facilitate reading comprehension. For this reason, the discussion below will focus primarily on students' perceptions of the value of commercially-available online dictionary applications as a tool to aid reading comprehension in Chinese cultural texts. A student who chose to read the digital course reader could do so in a range of digital devices, including a smart phone and tablet. This student could immediately find out the *pinyin* and English-language definitions of Chinese expressions by placing the mouse or cursor over the relevant character(s). With a further tap he or she could hear the expression read out aloud by a native speaker. They could now explore a text on their own and consider which translation from the online dictionaries offered the most likely meaning for a word or expression.

3.4 Survey instrument

In the penultimate week of the semester in both years, an anonymous questionnaire was given to the students, who were assured of the confidentiality of the findings. The sample comprised approximately equal numbers of males and females. The same questionnaire was used in both years (see Appendix 1). In 2013, 19 students responded to the survey and in 2014, 20 students responded. The survey instrument was designed to elicit both quantitative and qualitative data from the students on such topics as their previous experience of online dictionaries and other Chinese e-learning applications, the extent to which the digital material was adopted by the class, the preferred medium (e.g. desktop computer, iPhone, etc.), the preferred online dictionary application, pattern of usage, and problems experienced, as well as perceptions of the extent to which the e-technologies assisted them in their learning of course material. Some questions called for information from students (e.g. which platform they preferred), while others called on them to express agreement or disagreement on a five point scale. Other questions were open-ended. The results of the surveys used in both trials are set out below.

4 Analysis of results

4.1 Table of results

This section will discuss in turn the extent of student take-up of the provided e-technologies, their preferred platform for the use of digital tools, student preferred pattern of usage, and student perceptions of the value of the technologies. The major findings concerning take-up and patterns of usage are tabulated in Table 1.

Table 1. Take-up of the e-learning technology and patterns of usage

	2013 - 1 st trial	2014 - 2 nd trial
Prior experience of e-learning applications in Chinese	84.2%	80%
Used online course reader and used electronic dictionary	73.6%	85%
Preferred Pleco as the electronic dictionary	74%	65%
Preferred platform for viewing online material	Desktop 79% iPhone 47% Android smart phone 26%; Apple iPad 26% Other tablet 0% *Some used more than one device.	Desktop 80% iPhone 35% Android smart phone 15%; Apple iPad 20% Other tablet 0% *Some used more than one device.
Preferred pattern of usage:		
1. More than once a week	42%	5%
2. About once a week	32%	40%
3. Less than once a week	21%	45%
4. No access	5%	10%

4.2 Take-up of new e-technologies

An overwhelming majority of students chose to download the online course reader and read it with the aid of an electronic device of some kind. Not all students who did so chose to use the recommended electronic dictionary, Pleco. In 2013, some students cited the cost of Pleco but none did this in 2014. At the time of the first trial, the functionality of the free Pleco version was quite

limited. However, in 2014, more features were added to the free version. A handful of students mentioned that they used online services such as MDBG, with slightly more citing these services in 2014. Of student e-dictionary use, the most striking change from 2013 to 2014 was the almost complete disappearance of alternative mobile applications to Pleco. Further, even students who did not download the online course reader frequently claimed to use Google Translate and Bing to provide English language translations of course material.

A very small minority claimed to have no previous experience of Chinese e-learning tools. In 2013, one student claimed to have no computer or smartphone and preferred to rely solely on the printed course reader. Responses from this group included:

Am still yet to break the habit of Googling for all the information I need. (2014)

We were given a hard copy of course material which was more convenient. (2014)

The paper-based reader included some material that was not provided in the online reader, such as oral discussion questions, and glosses customised to the set readings. In this way, the two modes of reading, both online and in print, were designed to offer different but complementary methods of learning. Very few students decided to rely solely on the paper-based reader. This is an indication that the online reader was an attractive alternative for a strong majority of students. However, the curated glossary available in the paper-based reader was also important in their learning, an issue that we return to later.

4.3 Preferred platform

Somewhat surprisingly, the preferred platform for viewing the digital course material in both years was via the website on desktop computers (79%; 80%). iPhones were very popular (47%; 35%), followed by Android smartphones (26%; 15%) and the Apple iPad (26%; 20%). Some students were reluctant to read the full text on mobile devices. Since most were iPhone users, the relatively small screen (compared to larger-screen Android devices) might be a factor. Users of iPad users reported greater satisfaction with use of the e-technologies. Of the three iPad users in 2014, all expressed a high degree of satisfaction.

4.4 Pattern of weekly usage

In 2013, 74% of the students claimed to have accessed the online course reader at least once a week or more but this number dropped sharply to 45% in 2014. This could be due to a change in the procedure required in 2014. Students in 2014 were required to do at least three-quarters of the online exercises outside their class on a regular basis throughout the semester as a threshold requirement. Usage was monitored through the subject website. In 2014, students apparently spent more time on the online exercises required after class and spent less time on the online readings before class. This is not necessarily a pedagogic problem because students may have used the print reader with its customised glossary to prepare for class. The online exercises completed after class called for active engagement with the text and provided feedback.

4.5 Problems experienced

Students were invited to comment freely on problems experienced. In 2014, 35% of the student users cited technical problems. In some cases, the OCR conversion process resulted in less than perfect HTML copy. Errant spaces stopped Chinese readers from correctly recognising compound words. These comments point to the need for painstaking proofreading of OCR converted material. One student reported that the exercise material lacked clarity and that it was difficult to see what had been completed. One student found that the tests were “a little too easy compared to what is expected of us in the subject.” Another student complained that Pleco did not produce full transla-

tions and that they felt they also had to consult Google Translate. At least one student found the wealth of online resources available somewhat overwhelming:

A more succinct and less convoluted layout and outline of resources available and their presentation really needs to happen, ie is very overwhelming at the moment. (2014)

4.6 Students' perceptions of the e-technologies provided

In both years, students perceived that the e-technologies were of major assistance to them in their learning of the course material. They indicated overwhelming agreement with the statement that "the digital material had helped me to read and understand Chinese language course material more rapidly" (95%; 85%). Other points of agreement were on the convenience of learning on mobile devices (87.5%; 65%) and helping in class and test preparation (95%; 65%). A smaller number believed that e-learning tools helped the students catch up with the work they missed in class (58%; 40%). There was less agreement with the proposition that e-learning tools made learning more interesting than print and a few students found the hard copy more convenient. Students who claimed to have shared their e-learning experiences with fellow students were in a minority. In the open-ended questions on the questionnaire, students generally expressed strong enthusiasm for the online dictionary, such as "extremely valuable," "awesome," "fantastic," and "[use] should be compulsory." The online tools were "very useful," "super useful, and aided my success in this subject." They were "great tools to keep students interested" and "made studying much easier." According to one student, these e-technologies "should be available from the first week of the first year" of Chinese language study. Some students indicated they would continue to use online tools to assist their reading of Chinese after completion of the subject.

Some examples of student comments are given below:

The [digital] dictionary was extremely valuable and I was so grateful to be able to be one of the first to use it! It has made studying the material so much easier and you are definitely on the right track. The online course material, wiki, dictionaries are fantastic. Thank you! (2013)

The digital tools have been extremely useful and convenient. I intend to use Pleco frequently even after MCL has finished. (2014)

Only a few students chose to make electronic flash cards for their smart phones or tablets. This was no doubt due to the effort and technical expertise required.

Loved using flashcards on Pleco while commuting to and from uni. Also the optical character recognition is a life saver when I didn't prepare enough for class (although the teacher wouldn't have known). (2014)

5 Conclusion

The major finding of this two-year trial of a hypermedia Chinese dictionary application in a Chinese literacy course is that the new technology had a positive effect in improving L2 students' confidence in reading Chinese texts. The conversion of print reader to an online environment in the subject website assisted the intermediate L2 learners to make the transition from reading conversational Chinese to reading authentic or slightly rewritten discourse in Chinese literary texts. It was no longer necessary for the learners to spend hours looking up Chinese characters in a print dictionary. In particular, the use of the hypermedia dictionary aided students to identify word boundaries (one syllable or multi-syllable), choose amongst a range of definitions for the one most suitable, learn the pronunciation of new words and hear the text vocalized. New characters could be captured and converted into electronic flashcards for the learners' smart phones or iPads. In brief, the online environment offered the learners the chance to take advantage of a range of digital

tools, particularly electronic dictionaries, to read a range of more challenging texts, and to acquire a wider range of vocabulary with less frustration than conventional methods.

The provision of practical information through a community Wiki, ongoing technical back up, and instructor advocacy were crucial ingredients in the relatively high take-up of these initiatives and in the enthusiastic response on the part of the students. At the same time, it must be added that the students overwhelmingly took advantage of only one of the e-technologies offered, specifically, the online course reader and online dictionary application. This was perhaps in line with the investment that the students needed to make in terms of time and effort and also their level of technical proficiency. For example, making electronic flash cards, while strongly recommended, was rarely used during this trial because of the effort and technical expertise required. However, students who made the effort to use a flash-card-based e-learning regime to support their learning were the most vocal advocates of the benefits of the e-learning initiative in this subject.

As discussed earlier, one of the recent debates in scholarship on the use of hypertext is the relative efficacy of glosses or hypertext in assisting language learning. Another issue is whether it is better for students to use teacher-prepared customised glosses or generic online e-dictionary annotations. This trial found that while the online e-dictionary was warmly welcomed, students also wanted relevant ‘curated’ word lists, which some found more useful than the online dictionary. This is highly relevant to the needs of learners entering the intermediate level, who still need customised glosses as back up. For this reason, it is recommended that the practice of providing curated glosses in print form should be continued to assist the intermediate learners. However, it is possible that this would not be required for the more advanced learners.

Those students who availed themselves of the new technology had an overwhelmingly positive perception of the impact on their learning. The use of online reader with dictionary application allowed for much greater ease and speed in reading and comprehending the course material. For this reason, those who used the new tools found that preparation for class and tests was much easier. Most students found it more interesting to learn this way than from a print reader. A majority also agreed that the digital material, including the online exercises, gave them feedback on their vocabulary acquisition and helped them catch up on class absences.

We note that an important emerging issue for the future is to avoid a ‘digital divide’ within a class. There were a small number of students in the class who were notably less likely to make use of electronic aids. These students found the range of electronic tools provided somewhat overwhelming. If electronic technologies do indeed provide tangible learning benefits, it is necessary for educators to ensure that all students have an equal opportunity to access these technologies. In addition, there are challenges relating to which mobile device to support in the e-learning contexts. If “bring your own device” (referred to as BYOD in business environments) is the model of access, then educators have to decide what type of mobile platform to support (Apple, Android or others).

This project is a pilot study with a limited number of participants. In addition, the investigation was focused on student perceptions of the benefits of the e-technologies presented rather than learning outcomes. The goals of this project were not merely pedagogic, that is, to enable learners to master a specific corpus of language material, but were rather to promote learner autonomy in this difficult language. In other words, the goal was to enhance the confidence of the L2 learners in their ability to use an electronic dictionary to read any online material that interests them. In that way, the empowered learners could continue to read Chinese, with or without an instructor, into the future. It is hoped that future research could explore the longer-term advantages of training intermediate level L2 Chinese learners in the use of new e-technologies to enable them to reach a ‘take-off’ stage in maintaining self-learning of Chinese beyond the classroom.

Notes

¹ In the context of the Internet, the term “hypertext” generally refers to rich associative linkages made between disparate items of information. However, for the purpose of this study, the term “hypertext” refers primarily to the use of electronic pop-up dictionaries and associated aids used in reading a foreign language. For an example of a broad definition of the term, see Ensslin (2006): “Hypertext is conceived as an electroni-

cally displayed, created, edited and published text form organised in nonlinear chunks, which are connected by associative links (pp. 13-14).

² These applications offer online Chinese dictionaries and a range of other services.

³ ABBYY FineReader offers optical character recognition capability. It can recognize documents in up to 189 languages including Chinese. Documents can be edited and saved in a variety of formats.

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Appendix 1

Survey instrument

You are invited to fill in this survey which will enable the Chinese program to learn more about your response to the e-learning trial in this subject. This will help us to further refine our teaching methodology and improve student learning in this subject in future.

Your participation is warmly encouraged but entirely voluntary. Before you fill in this survey read the Plain Language Statement and sign the Consent Form for the Chinese E-Learning Project.

This questionnaire is anonymous. Do not write your name.

1. Before you commenced Modern Chinese Literature, had you any experience in using Chinese e-learning applications such as electronic dictionaries?
If so, what were you using (Pleco CC-Dict etc).....
 2. Have you had a look at the Chinese Resource Wiki ? Yes/No.
 3. For those who did use Chinese Wiki, tick any items you looked up on the Wiki.
 - a) How to download electronic dictionaries.....
 - b) How to use electronic flashcards.....
 - c) How to type using pinyin.....
 - d) How to find Chinese language learning resources beyond that taught in this subject.....
 - e) How to revise pinyin pronunciation.....
 - f) How to learn or revise stroke-order in writing Chinese characters.....
 - g) How to find out more about Chinese current affairs in English language web-sites.....
 4. Is there anything else you would like to find in the Chinese Resource Wiki? Please fill in below.
.....
.....
 5. Have you downloaded the digital course text reader and used an electronic dictionary to help you read the course material in Modern Chinese Literature?
Yes/No
 6. Did you use Pleco to help you read the digital course material? Yes/No
Or another e-dictionary? Yes/No If yes, please insert name of e-dictionary.....
 7. If you viewed the digital course material using an electronic device, please circle which device you used (you can circle more than one).
 - a) desktop computer
 - b) Android smart phone
 - c) Apple iphone
 - d) Apple ipad
 - e) other i-tablet.
 8. How often did you use the digital Chinese language course material throughout the semester?
Circle your chosen response.
 - a) Less than once a week
 - b) about once a week
 - c) several times a week
 9. Have you experienced any problems using the online course material and the digital dictionary? Please fill in below.
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These questions relate to the way that e-technologies may or may not have improved your learning of Chinese. You will be asked whether you agree or disagree with the following statements. Insert answers from 1-5. 1=strongly disagree; 2=disagree; 3=neither agree or disagree; 4=agree; 5= strongly agree.

- 10. The digital material helped me to read and understand Chinese language course material more rapidly.....
- 12. The digital material made class and test preparation easier.....
- 13. The digital material (eg. the online exercises) gave me feedback on how well I was learning new vocabulary and expressions....
- 14. The digital material allowed for convenient learning on mobile devices such as i-tablets, ipads and mobile phones.....
- 15. The digital material made learning Chinese more interesting than reading from a print reader.....
- 16. I shared my experience of digital learning with other classmates.....
- 17. The digital material allowed me to catch up on work missed in the case of absence from class
- 18. Any other comments on the usefulness of these digital tools in assisting your learning of this subject

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THANK YOU VERY MUCH FOR PARTICIPATING IN THIS RESEARCH PROJECT. YOUR PARTICIPATION IS GREATLY APPRECIATED!

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