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A workflow for managing information for research using the iPad, Sente and Dragon Dictate: a collaboration between an academic and a research librarian

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Abstract. This article describes how contemporary referencing software, a tablet device and speech recognition software were used to improve the traditional research workflow, referring primarily to the process of finding journal articles, downloading the bibliographical details with full text, then reading and annotating them in an as efficient way as possible. This is done using Third Street's Sente referencing software on a Macintosh to manage the bibliographical database and to automatically synchronise with its companion application on the iPad; then using the built-in tools of the Sente application on the iPad to highlight any text in the article that is of particular interest. The highlighted passages are automatically synced back to the Macintosh application, and the researcher then uses Nuance's Dragon Dictate on the Macintosh to dictate a summary of the article directly into the notes field in Sente or into the notepad of Dragon Dictate.

The issue

Referencing software plays a key role in managing information for research. It enables the researcher to set up a database of bibliographic references that are readily accessible on a laptop or tablet, any place or time. Furthermore, it allows the researcher to conduct a keyword search of the database and retrieve the results with accompanying abstracts and/or notes quickly and efficiently.

At Charles Darwin University (Northern Territory, Australia) library staff routinely work with students and academics to provide training and support in using referencing software such as EndNote. However, at the time of writing a need arose for a referencing software that is available on the iPad and because EndNote was not available as an iPad application at the time of writing, library staff were approached to help identify alternative referencing software that could meet the needs of those academic staff who were using iPads for their research activity.

Initial assessment

The growth of e-books and e-readers in recent years has been substantial (Hoffelder 2012). Sales figures for the iPad in particular have been significant (Mandal 2012). A study undertaken by Gertner (2011) compared a group of readers using traditional text and e-text. Gertner found that those reading text on an iPad had far better comprehension and transfer learning than those reading hard copy text (Gertner 2011,

33). Thus, it seems appropriate to investigate possible ways to integrate tablets into the research process. This article focuses on one way to do this.

Using the key criteria outlined by Gray (2009) for software capabilities, a list of requirements was drawn up. A range of referencing software, such as Zotero, Papers and Mendeley was surveyed, before identifying Third Street's Sente as the best product meeting all of the requirements noted. Sente is an Apple Mac application that seemed to offer all of the functionality required and together with Dragon Dictate voice-recognition software, has become a powerful package in improving research productivity.

Tablets for research information management

While it is possible to simply read an article on an Apple or Windows computer, the iPad offers the benefit of portability, enabling reading, re-reading, annotating and highlighting that can be done on the move. All this could of course be done on a laptop, but the smaller form factor of a tablet device further increases the benefit of portability. The second advantage stems from the fact that tablets are predominantly reading devices, whereas a computer/laptop is predominantly a writing device. Thus the user interface on tablets is optimised for an improved reading experience. This however, means that while reading and annotating articles on a tablet is convenient and efficient, notetaking and summarising can be fairly cumbersome tasks. Therefore, it is more practical to read an article on a tablet and then synchronise the highlighted articles from the tablet with the companion application on the laptop where one can then enter the notes for the article into the dedicated field in the laptop environment with a full-size keyboard, and so on. This last step of summarising an article, though, raises another issue.

Consider this scenario. A researcher is sitting in front of the computer with the tablet (that is, reading) device positioned to the side of the computer. When summarising the article, the researcher's eyes must focus intermittently on the article on the tablet and the summary/notes field in the referencing software on the computer/laptop monitor. Because both hands are used for entering text with the keyboard, the researcher cannot keep a finger on the line or paragraph last read and so has to remember the location where he or she took his or her eyes off the article before switching to the summary/notes field to insert his notes. When the researcher has finished entering these notes and wants to summarise the next sentence/paragraph, his eyes must shift back from the summary/notes field on the laptop to the article on the tablet. Without a marker it takes a couple of seconds to find the spot to continue the summary. This problem is worse for transcribing a long quote, one that is more than just a couple of words. To accurately transcribe a long quote, the researcher's eyes need to switch back and forth between the article and the summary/notes field more often, thus requiring even more time to identify the locations in the sentence. This article describes a solution to this particular problem.

Action: the basic requirements

The hardware and software used for the proposed workflow are:

- Apple computer (in this case, a 2009 MacBook Pro running OS 10.6.8 Snow Leopard)
- Apple iPad (v2)

- Referencing software Sente (v 6.5.8) installed on the Apple Mac and the iPad (v. 1.0.12). Note that Sente is currently only available for Apple computers and the iPad.
- Nuance's Dragon Dictate (v. 2.5.2)
- Plantronics GN9330 wireless headset
- Privately owned PC due to possible restrictions such as firewall policies and lack of administrator rights

Finding and retrieving articles

Searching for an article and importing the reference, as well as linking the downloaded PDF, is very convenient with Sente as it can all be done from within the application. This is in contrast to some other referencing software applications, which require the researcher to search for a reference externally, through a journal database or a publisher website, then import it into the bibliographic database, download the full text file and link it to the record. This can be a tedious process as it involves a number of steps. In Sente, all that is required is to enter details of an article, such as the title, and then select the 'find' button. Sente will then search across the available range of databases (Google Scholar, EBSCOhost, and so on) and produce a list of results from which references of interest can be selected. When the PDF is available, the user can select the file and Sente will import it into the database. Sente will then search for the matching reference and when found, attach the downloaded PDF to it. This feature of searching and retrieving the reference and the PDF is described by Scholz (2012a) as a 'killer workflow', and provides a compelling reason to switch from any another referencing software to Sente. However, Sente has further advantages.

Scholz (2012a) highlights the additional feature of tagging in Sente as one of its main advantages. Sente allows the researcher to add tags to records as they are entered into the database, and it allows any tags for a specific article to be added into a 'QuickTags' box. In this way the researcher can create a hierarchy of tags and easily and quickly access any references of particular interest.

Sente, uniquely, also offers a companion application (app) for the iPad, thus enabling its use as an article-reading device. This app synchronises automatically and reliably with the 'bigger brother' on the Mac, and without disrupting the workflow, as long as both systems are connected to the Internet. This feature provides the capacity to take advantage of the unique features of both the Apple Mac and the iPad (Scholz 2012b). Another advantage is that the researcher's database of references is also automatically backed up on the Sente servers during synchronisation. ***Figure 1*** shows a screenshot of an annotated article in Sente on the iPad. ***Figure 2*** shows the same text in the main Sente application on an Apple Mac, after it has been automatically synchronised.

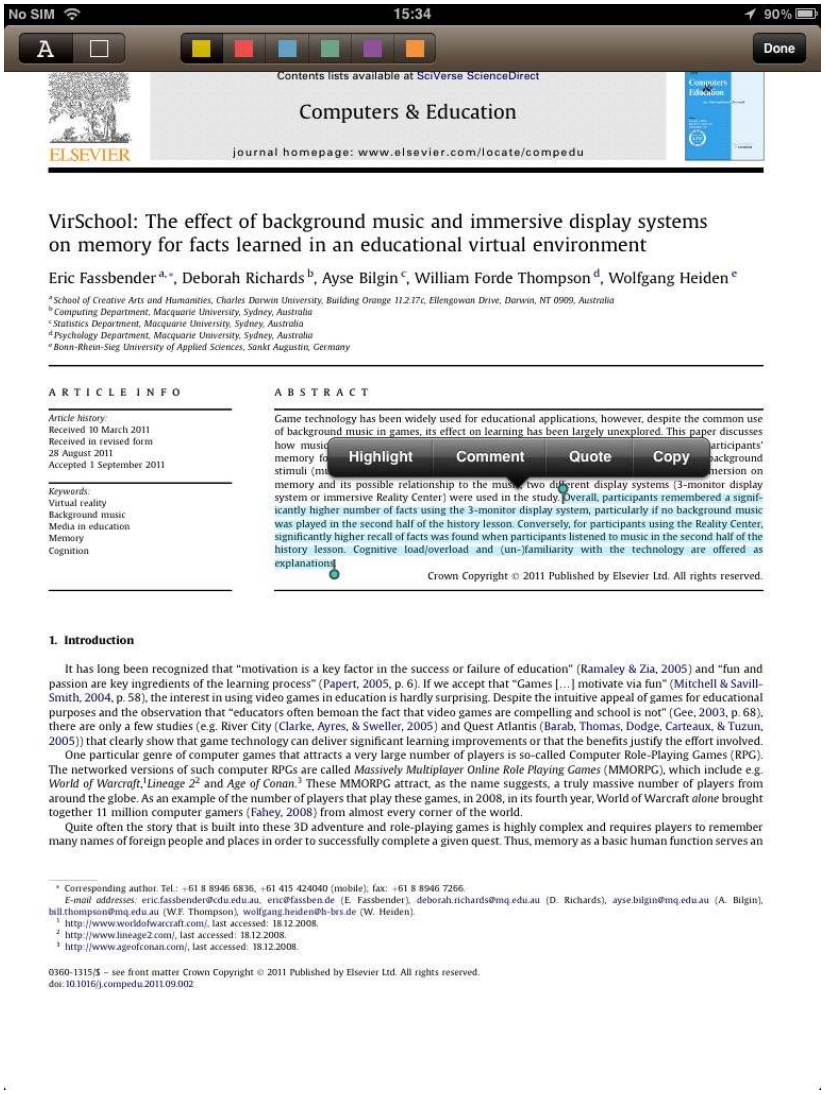

***Figure 1**: Screenshot of a section that is about to be highlighted in the Sente iPad app*

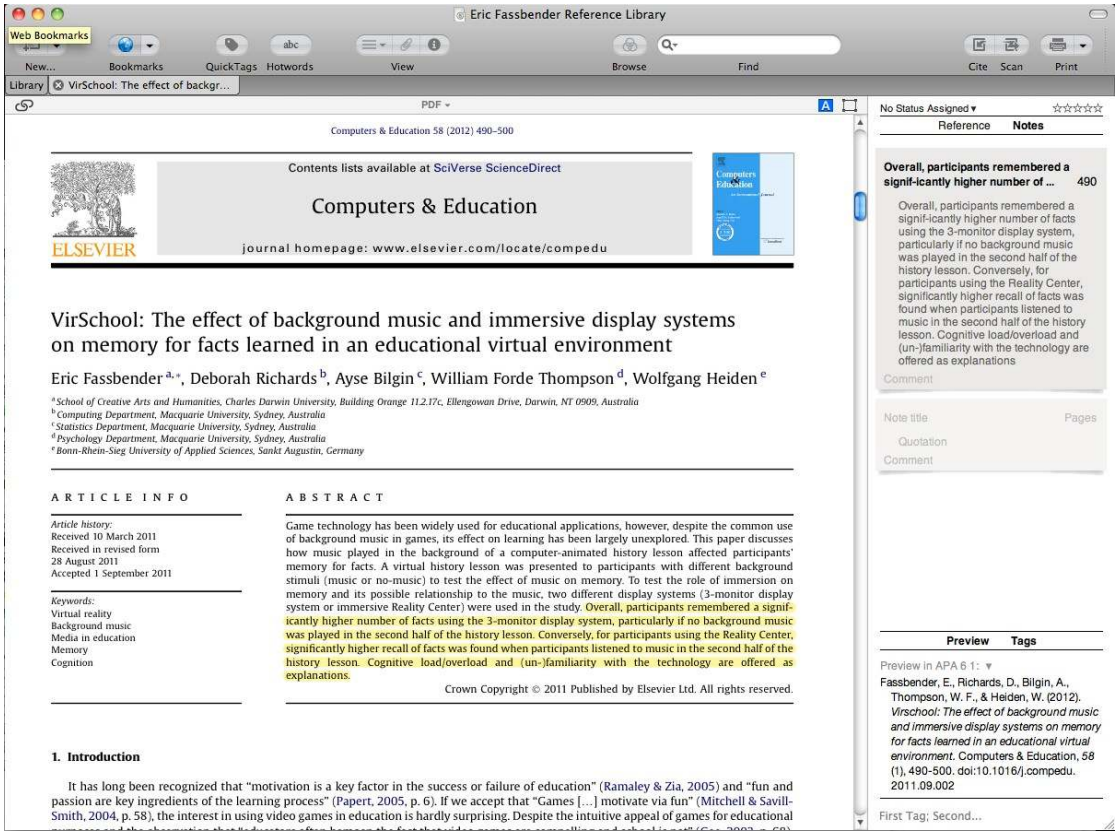

***Figure 2**: The section that was highlighted in the Sente iPad app (see Figure 1) has been synchronised automatically with the main application on the Mac*

The automatic synchronisation between the iPad and Mac applications means that, having read and highlighted the relevant sections of the article on the iPad, the researcher can immediately start to enter notes on the Mac in the dedicated field on the right-hand side (see **Figure 2**). Traditionally, the researcher would manually type this information, but, as mentioned, this can be a slow process. These problems can be overcome by using voice recognition software such as Nuance's Dragon Dictate, which enables the researcher to focus on the article, think about the presented information, form a sentence in their head and speak their thoughts into the microphone, from which it is transferred into the application window.

Figure 3 shows a researcher using Sente to annotate articles on the iPad and after they have been synchronised with the main application on his Apple Mac, using the wireless microphone (attached to shirt) and speech-recognition software for note-taking and summarisation.

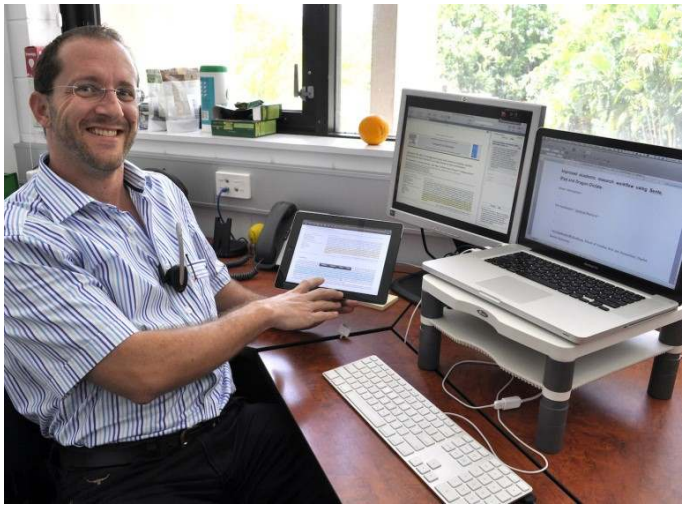

Figure 3: *Article download is completed in Sente on the laptop (left monitor), the article then read and any highlights made on the iPad (centre) and the summary/analysis spoken into the wireless microphone (attached to shirt). The transcribed text is then transferred from the Dragon Dictate Notepad into the Sente Notes field (in same window on left monitor). On the right monitor is the article that the author is currently working on (in fact, the very article you are reading right now). In-text citations are then inserted into a Word document from Sente (Photo: Mark Hilton)*

Results: The advantages

The workflow described above has a number of advantages. Apart from the advantages of an online database, the workflow as described allows the researcher to remain focussed on the task at hand (Gertner 2011,12). Furthermore, this workflow will also benefit those suffering from RSI (Repetitive Strain Injury), or back or shoulder pain, caused by overuse of the keyboard and mouse. The ability to access articles via the touchscreen on the iPad and to read articles in different reading locations (such as an armchair or the library) will also prove beneficial.

The argument that using speech recognition software is faster than writing does not hold completely true. From the researchers' experience, the accuracy of speech recognition software is still only about 90–95%. Consequently, the text still needs to be proofread and errors are best corrected with a keyboard and mouse. Having said that, using voice-recognition software is certainly not slower than typing, so speed is neither an advantage nor a disadvantage. However, to be able to mentally construct sentences and then simply speak them is certainly a great advantage.

There are alternatives to using the Plantronics wireless headset and Dragon Dictate for voice-recognition and dictation. One alternative is to use an iPhone 4S or 5, and combine Apple's Siri voice recognition tools with the Notes app on the iPhone. The process here is to read the article (on the iPad or any other format), create a new note in the Notes app of the iPhone 4S/5, recite the summary of the article then synchronise the iPhone with the Apple Mac, and then copy and paste the note contents from Apple Mail (which the Notes app synchronises with) into the dedicated notes field in Sente. This allows changes to be made to the notes on the iPhone straight away. Siri is, however, still in beta state and the recognition rate is not considered quite as sophisticated as that of the more mature Dragon Dictate. Nonetheless, the

recognition accuracy is certainly adequate for the tasks described here. ***Figure 4*** shows the Notes app on the iPhone 4S. The microphone icon next to the space bar activates the Siri voice recognition.

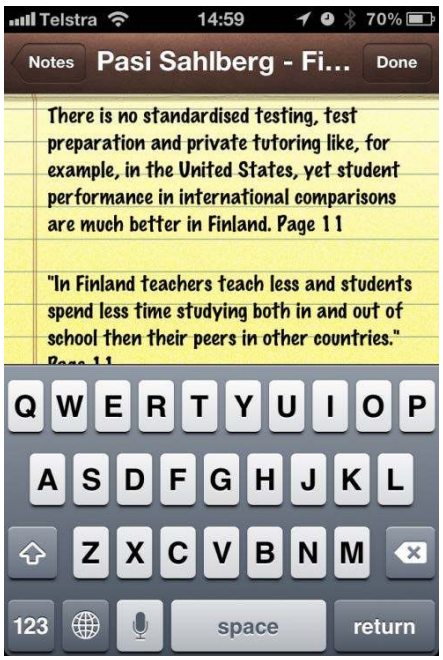

Figure 4*: A screenshot of note taking on the iPhone 4S, using Apple's Siri voice recognition*

The disadvantages

One of the main disadvantages derives from the fact that the PDFs of articles need to be 'editable' to allow highlighting and cross-searching of the articles. To be editable, the PDFs of articles must be entirely digital rather than simple scanned documents. PDFs created by scanning are images not text, which means they cannot be highlighted or searched using a keyword search query. Therefore editable PDFs are essential for the described workflow. Unfortunately, this format is more expensive so a common practice with, say, interlibrary loans is to offer non-editable PDFs as the first option, unless otherwise requested. Furthermore, in some cases publishers do not provide editable PDFs, and for older material editable versions may not be available. Thus, the user will undoubtedly end up with one set of PDFs that are editable and one set that is non-editable. From our experience the rate is about 90% to 10% in favour of availability of editable PDFs.

Lessons learnt, conclusions and future research

This article has highlighted several issues that occur in the traditional research workflow of finding, retrieving, storing, reading and writing academic publications. It has identified a number of problems with the traditional workflow, which occur when using a) print articles, and b) certain referencing software. The first problem is that printed articles are heavy, require physical storage, can only be searched manually and are practically immobile. This article has demonstrated that bibliographic management software can help solve these problems, as it can be installed on a laptop or tablet device. Compared with a filing cabinet of printed articles, the database

created via such software is extremely light, even accounting for the weight of the laptop and/or tablet device (particularly given that laptops and tablets serve multiple uses when the user is on the road). Furthermore, a digital reference and bibliographic database offers very fast results for keyword search queries, facilitating the retrieval of relevant articles within a matter of seconds. Moreover, if installed on a laptop or tablet device, the digital reference and bibliographic database is highly mobile, with references and articles accessible instantly (such as at conferences or in meetings).

The other set of problems described were reading distractions created by the multitasking environment of a standard computer, and the health risks created by sitting in one position for too long or doing the same activity too often (for example, back pain, RSI). Added to this is the inherent problem of having one's train of thought interrupted in the process of reading a section in an article, formulating a summary and then writing this summary down. The described workflow, based on using a tablet device, addresses these problems. The article suggests that such devices are more dedicated for reading. It also suggests that the tablet's portability frees the researcher from being desk-bound. Thirdly, it argues that using voice-recognition software allows the researchers to think about what they have just read in the article, place a finger on the sentence or paragraph that they are summarising, formulate the summary with their natural voice, and then return to the exact position where they lifted their eyes from the article and continue reading the article. This is significantly more efficient than having to switch between applications multiple times while summarising an article.

On the basis of these advantages, the article then proposes that for the requirements of the researchers, Sente is the most effective bibliographic software package available, as it offers companion applications on the Apple Mac and iPad (thus allowing the use of a tablet as a reading device). It also features automatic synchronisation of the database across devices (Apple Mac and iPad), in-app search features, a fully integrated reference and PDF-import feature as well as a direct search for references and full-text PDFs from within the application, thus eliminating the need for arduous export/import procedures, as required in other software applications. To take advantage of all these benefits, however, 'editable' PDFs are required.

The latest version of Apple Mac OSX Mountain Lion already features system-wide 'Siri' voice recognition and Windows is likely to be on its heels in the near future. Given the significant advantages offered by voice recognition, it is sensible to become familiar with this technology, sooner rather than later.

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