Emerging Technology Trial 2011
Digitizing paper-based instruction with smartpens and pencasting

Final report

Learning Network Queensland / Queensland VET Development Centre

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Acknowledgement

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Table of contents

Purpose ........................................................................................................................ 4
Organisational overview ............................................................................................ 4
Trial overview ............................................................................................................. 4
Trialling the technology ............................................................................................ 5
  Research ................................................................................................................ 5
  Implementation ...................................................................................................... 5
Classroom trial/s (via online classrooms) ................................................................. 6
Implementing the technologies ................................................................................. 6
  Evaluating the technologies ................................................................................. 6
Findings from the evaluation of the technology ....................................................... 7
Strategies to enable use of the technology ............................................................... 9
  Creating the standards for using the technology .................................................. 9
  Barriers to implementing the technology ............................................................ 10
  Additional considerations .................................................................................... 10
Additional materials ............................................................................................... 11
  Learner feedback ................................................................................................ 11
  Feedback from survey .......................................................................................... 11
Presentation in the LMS ........................................................................................... 14
  Resources ............................................................................................................. 15
For more information .............................................................................................. 15
Purpose

The purpose of the Emerging Technology Trials\(^1\), conducted by the Australian Flexible Learning Framework’s (Framework\(^2\)) E-standards for Training\(^3\) business activity, was to explore emerging technologies and identify areas where future standards work may be required. The trials are also an important tool for identifying ways that the emerging technologies may be utilised in teaching and learning in the wider national training system.

Organisational overview

The trial is a collaboration between Learning Network Queensland and the Queensland VET Development Centre.

Learning Network Queensland (LNQ) is a network of learning centres located throughout Queensland. LNQ provides a range of localised products and services dedicated to increasing learning opportunities for people in regional, rural and remote Queensland.

The Queensland VET Development Centre (QVDC) works collaboratively with Australian Government and State agencies, public and private training organisations, industry and universities to lead and enable the Queensland VET sector to develop the right products and staff capability to deliver the right skills for Queensland.

LNQ provided the teachers and learners in order to accomplish the outcomes of the project. QVDC provided the project manager to oversee the project.

Trial overview

The project focused on using digital pens to enable teachers to create learning content, and deliver it to learners in the form of pencasts. The level of engagement learners have with the pencasted material was analysed and compared to the traditional method of scanning PDFs to create the material. At the same time, the project developed a model of best practice for using digital pens of all varieties.

Project deliverables:

- Hardware purchased, staff trained
- Completed pencasts
- Completed pencasts available to learners
- Analytics set up and tested
- Analytics results, learner ad-hoc feedback
- Feedback results


\(^2\) The Framework is the national training system’s e-learning strategy [http://www.flexiblelearning.net.au/](http://www.flexiblelearning.net.au/)

\(^3\) [http://e-standards.flexiblelearning.net.au/index.htm](http://e-standards.flexiblelearning.net.au/index.htm)
Trialling the technology

Research

In the trial, a few different research options were taken. The following questions are answered in the Findings from the evaluation of the technology section of this report on page 7:

- The technology behind the pens' hardware — How do the pens work? Do they rely on batteries? A special notebook/tablet? Do they connect to a PC easily? Are they too bulky for writing for long periods of time?
- The software options - How does the sync software work? Is it user friendly? Is it easy to publish material?
- What were other educational technologists using in this field? What was the dominant brand?
- How could we make this material transportable? Can we use this material with mobile devices?

Recent reviews for the pens can be found at the following publication:

- Queensland Government Online Newsletter4, Volume 10, Issue 1, February 2011 deals with Digital Pens and note taking for learners with disabilities. This issue looks at a variety of common pens in the field and notes those found the most useful for supporting learners with disabilities.

Implementation

- The pens, notepads and accessories were purchased, and software installed. (See Findings from the evaluation of the technology on page 7)
- Training for the teachers undertaking development of the material.
- Experimentation into length of presentation, storyboarding and delivery explored. (Pilot group of learners used to gather initial data)
- Mobile delivery techniques explored via iPhone and iPad apps.
- Evaluation of three digital pen brands – Livescribe used in trial as it was the only pen with voice technology.
- Trial pencasts created and provided to a test group for modification and improvement.
- Feedback gathered from the pilot group used to develop standards for creating pencasts. This is documented in the ABC’s of Pencasting which can be viewed at http://www.livescribe.com/cgi-in/WebObjects/LDApp.woa/wa/MLSOverviewPage?sid=14TZTQbKSBQI
- Pencasts on a variety of topics for Module 1 of Introductory maths and senior maths were created and provided to learners in place of PDFs. Module 1 was

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chosen because these are the foundation topics that learners need the most help with. By creating pencasts for these topics the project team was able to receive valuable timely feedback from learners (see Feedback section on page 7. For a full description of the course topics visit http://www.unilearn.net.au

- Feedback was gathered from learners using pencasts (see Feedback from surveys section on page 12)
- Analysis of benefits for distance and online learners can be found in the Feedback section on page 12.

**Classroom trial/s (via online classrooms)**

The plan for the content was to deliver it via the learning management system (LMS) that LNQ employs as an embedded content object. It can also be directly linked to, emailed, or viewed on mobile devices.

Due to unforeseen circumstances, the trials took place on individual bases as the LMS that Brisbane North Institute of TAFE (BNIT) was using - where the courses were to be hosted - was scheduled to close mid-course for the learners. So the learners were not moved into an online classroom where they would need to be moved again mid-study. Unfortunately the new LMS that has been chosen for LNQ online courses did not have the course up and running in time to allow for effective distribution of the pencasts.

The content was offered alongside the traditional content in PDF form. From there, web tracking analytics (Google Analytics) were installed on the relevant pages, to analyse quantitative data, like page hits and number of views for each. This was followed-up with a qualitative survey filled out by the learners, asking them which method they preferred and why.

**Implementing the technologies**

**Evaluating the technologies**

**Positives**

- Easy to pick up and understand for a teacher with no prior experience.
- Simple to demonstrate, many prior examples available for educators on the web on Livescribe community website\(^5\).
- Long battery life – can use a whole day without it dying, lots of storage, a choice of 1G, 2G, 4G or 8G storage on the pens.
- Options for writing-to-text recognition or speech-to-text recognition are available. Text recognitions software using MyScript\(^6\) are available for all pens, speech to text is available for Livescribe pens. (Quality of recording/writing will play into this)

\(^5\) http://www.livescribe.com/cgi-bin/WebObjects/LDAApp.woa/wa/CommunityOverviewPage
Negatives

- Proprietary notepad required for the Livescribe pens; however Livescribe has now made it possible for you to print your own paper on demand7.
- In reference to pencasts for Livescribe smartpens - movies delivered on the web in Flash. Could be difficult to port to other technologies later.
- In reference to pencasts for Livescribe smartpens - content required to be uploaded and delivered on the Livescribe site

Findings from the evaluation of the technology

From a learner’s standpoint, the voice was very important as this allowed the teacher to add in additional comments that are difficult to convey in writing alone. Evaluation of the pens occurred once the products were purchased. The three pens evaluated were the Aiptek Premium III8, Intellipen9 and Livescribe10.

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Aiptek My Note Premium III (32MB)</th>
<th>Intellipen 1GB</th>
<th>Livescribe 4GB Echo Smartpen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating pencast</td>
<td>Clipboard captures writing and software on computer converts to file. Requires Aiptek software on computer to create file. Software is bundled with pen.</td>
<td>Special receiver hooked to top of paper captures writing on USB. Easy to view on pen but not easy to view or manipulate on computer. Upload stored digital notes via USB port.</td>
<td>Pen captures both written and voice. Sync voice up to written words or drawings.</td>
</tr>
<tr>
<td>Cost</td>
<td>$179.00 Package contents: Notepad folder, Pen, USB cable, Rechargeable batteries, MyInk software suit, A4 tablet, Quick installation guide</td>
<td>$149.00 Package contents: Digital pen, USB receiver, USB cable, Software and user manuals stored on the receivers memory, Quick installation guide, Vision objects software</td>
<td>$219.00 Package contents: Dot paper starter notebook, Micro USB cable, Interactive getting started guide, Smartpen tips and tricks, Two ink cartridges, Two smartpen caps</td>
</tr>
</tbody>
</table>

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7 http://www.livescribe.com/en-us/faq/#/en-us/support/kb/?View=entry&EntryID=221
9 http://www.intellipen.co.za/
| **System requirements** | Microsoft Windows XP/2000/Vista  
Pentium II 1GHz or equivalent  
256MB of RAM  
CD ROM drive  
USB port  
Colour monitor | Microsoft Windows XP/2000/Vista  
Pentium II 1GHz or equivalent  
200MB available hard drive space  
256MB of RAM (recommended 512MB)  
CD ROM drive  
USB port  
Colour monitor | Intel-based Mac with Mac OS® X 10.5.5 or later, including 10.6  
Windows® XP with SP3 or Windows® Vista or Windows® 7  
600 MHz CPU or higher  
300 MB minimum free disk space  
USB 2.0 port  
Internet connection  
Livescribe Desktop 2.1.1 for Windows or 2.1.2 for Mac OS |
| --- | --- | --- |
| **Viewing by others** | Can be shared via email | View on pen. Can be viewed in other formats but requires software to view and to share. | Can be shared from a web based storage area.  
Can email links to learners. |
| **Expandability** | Each page is captured individually | Each page is captured individually | Each page is captured individually; however, you can create books where you can order the pages and add to them |
| **Audio** | Not available | Not available | Available |
| **Mobile media apps availability** | Read through PDF reader or webpage for HTML | Read through PDF reader or webpage for HTML | iPhone and iPad using the F-Browser app Android, Blackberries, and soon to be available on windows7 phones – the app allows for interactivity of the notes – Any mobile media device that supports Flash can view links directly sent to learner. Phones that do not support Flash can view the files via the online community forum by simply searching under the specific area and title provided by the teacher. (Livescribe is currently working on a solution for viewing Flash in a different format) |
| **Publication format** | Microsoft Word, Text, BMP, JPEG, PDF and HTML | PDF, Text, Word Pencast, imbedded Flash file, PDF, HTML and Evernotes |
| **Charge** | Runs off batteries that are rechargeable through the USB connection | Runs off batteries that are rechargeable through the USB connection | Runs off batteries that are rechargeable through the USB connection |
After the initial evaluation, and the lack of ease and voice in the Aiptek and Intellipen were identified, the trial went ahead with the Livescribe smartpen as this was the only pen of the three with the voice option and the ability to share through the web.

Strategies to enable use of the technology

The rollout strategy comprised:

- Capable development team trained
- Training extended to key lead teaching staff, supported by development team
- Other users trained one-on-one as necessary
- Training was made simple enough to ensure 80% of essential material was absorbed during first session. Focus was on practical, hands on training.
- Handout created and delivered to allow teachers to see smartpen workflow at a glance.
- An ABCs of Pencasting was created using the Livescribe technology to help teachers understand how to use it and the resources it could create.

Creating the standards for using the technology

In order to create effective pencasts, it was necessary to create a few trial pencasts and then have learners review them to determine what worked and what didn’t.
The initial pencast used quite a bit of written explanation.
  - Learners preferred less writing from the feedback and more of the voice feature to be used. The voice feature was also too soft on the first example and the writing was too soft so some of the images did not come across as intended.

The second pencast created had the voice turned up, darker writing and more voice with less written explanation.
  - Learners were happier with the second pencast created over the first and said that they understood it better as they could sit and watch the problem being worked out and listen as the teacher talked about how to do the problem. The learners said that it felt more like they were in a classroom learning the topic.

The third pencast created put a couple of concepts together in a cluster to enhance understanding.
  - The learners felt this worked well for concepts that went together in the learning process.

The next consideration was the size of the paper

- The project created tutorials for maths and science for online courses that could be accessed via a computer, laptop, iPad or mobile device. The screen size of these devices vary so the project team needed to consider how the tutorial would play. To create one size that works with a variety of different screen sizes than the table pages have the most versatility. To enhance the viewer area of larger screens, the A4 paper was chosen so that more of the concept appears on a page.

A pencast titled the ABC’s of Pencasting can be viewed at

http://www.livescribe.com/cgi-bin/WebObjects/LDApp.woa/wa/MLSOverviewPage?sid=14TZTQbKSBQI

The above pencast talks about what consideration teachers need to take into account before creating a pencast.

**Barriers to implementing the technology**

There were a few barriers that came into play in the project’s progression:

- Standard operating environment lockdown, making it difficult to install the necessary software on key PCs rapidly.
- Flooding in Queensland caused delays, as well as reshuffling the audit order for Queensland institutes, causing teachers to be tied up with finalising audit material.
- Approving funds to purchase hardware.

**Additional considerations**

Future problems that may arise:

- Hosting of the material on the Livescribe site could be problematic in the context of TAFEs requirement to centralise content in the LCMS.
● Livescribe could be construed as a ‘social networking site’ as it has social components to it, such as commenting. The DET Standard of Practice does not ban social networking sites; however, the Standard of Practice, in the section ‘Interactions with Students’ states “You must not use social media sites such as Facebook, Twitter, My Space or You Tube to contact or access students enrolled in any state educational facility.” Advice from DET Ethical Standards indicates the intention of the Standard of Practice was not to restrict the use of educational material within the sites, but to provide standards of behaviour around inappropriate material. Depending on the Institute’s ‘Acceptable Use” policy, some social networking sites may have restricted at Institute level due to things such as bandwidth concerns or the Institute being ‘risk averse’.

● Potential difficulty in re-contextualising of material. Much like a recorded lecture or instructional video, each set of notes written with a smartpen is a recorded, presentation-based instruction. You can’t change the instructor’s words later or what they’ve written. Any material would need to be re-created to change its context.
  ○ To overcome this problem, the project team found that if each concept within a cluster or session was kept on a separate page then if one portion of the concept required changes only one page would need to be re-created.

● Livescribe has announced it will have a PDF compatible version viewable using Adobe Reader that will still contain all of the interactive features and voice abilities. This solution will make it very easy to host the product on organisational websites for learners to easily view.

Additional materials

Learner feedback

To preserve anonymity, the surveys did not collect any learner information.

The feedback occurred after viewing one or more of the following pencasts, depending on which topic the learner needed assistance with. The pencasts focused only on tutorials that learners would find beneficial in order to obtain authentic feedback.


LCM and LCD - http://www.livescribe.com/cgi-bin/WebObjects/LDApp.woa/wa/MLSOverviewPage?sid=7gGFwDcknFJ8

Calculating Interest - http://www.livescribe.com/cgi-bin/WebObjects/LDApp.woa/wa/MLSOverviewPage?sid=lC7RF8xN6DfL

Feedback from survey

<table>
<thead>
<tr>
<th>100 learners surveyed</th>
<th>44% response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question asked to learners</td>
<td>Measurement used in</td>
</tr>
</tbody>
</table>

Australian Flexible Learning Framework
Learners rated the quality of the material created a 4 on a scale of 1-5.

<table>
<thead>
<tr>
<th>Question asked to learners</th>
<th>Measurement used in Survey</th>
<th>Cumulative score of the 44 participants</th>
<th>Cumulative /participants</th>
<th>Average or Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some of the content was delivered in pencast form. Did you find these helpful?</td>
<td>scale of 1-5</td>
<td>171</td>
<td>3.89</td>
<td>average of 3.9</td>
</tr>
</tbody>
</table>

Learners found the material on average helpful, rating it a 3.9 on a scale of 1-5.

Sixty-six per cent of the learners found the pencast very helpful, with one per cent saying it was ‘just as helpful as a written response’, while nine per cent were not sure and 14% found the written material ‘more useful’ than the pencast. Overall 77% had a positive review of the pencasts.

<table>
<thead>
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<th>Cumulative score of the 44 participants</th>
<th>Cumulative /participants</th>
<th>Average or Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you know you can download and access the Pencast materials on mobile devices?</td>
<td>yes</td>
<td>17</td>
<td>0.39</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>27</td>
<td>0.61</td>
<td>62%</td>
</tr>
</tbody>
</table>

Sixty-two per cent of the learners did not know that an application existed for their mobile media device. This information will need to be provided in online courses to alert learners on how they can access these pencasts from their phones and other mobile media devices.

<table>
<thead>
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<th>Question asked to learners</th>
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<th>Cumulative score of the 44 participants</th>
<th>Cumulative /participants</th>
<th>Average or Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you like to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Eighty-four per cent of the learners would like to access these notes on their mobile devices. This information will need to be provided in online courses to alert learners on how they can access these pencasts from their phones and other mobile media devices.

<table>
<thead>
<tr>
<th>Question asked to learners</th>
<th>Measurement used in Survey</th>
<th>Cumulative score of the 44 participants</th>
<th>Cumulative /participants</th>
<th>Average or Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you like to see an area that allows you to request a topic to be made into a Pencast?</td>
<td>yes</td>
<td>35</td>
<td>0.80</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>don't care</td>
<td>9</td>
<td>0.20</td>
<td>20%</td>
</tr>
</tbody>
</table>

Eighty per cent of learners wanted an area where they can have input to the pencasts created to help them improve their understanding of the topic. An area within the LMS will be provided in order for learners to have input into pencast creation.

A few examples of the anonymous comments provided during the survey.

- “I found it easier to follow when I changed the visual so I could only see recorded writing once it was written...not before. This kept me focused on what was being discussed instead of skipping ahead and reading the greyed areas that had yet been discusses.”
- “It was confusing for the first minute but after the second time watching it I understood long division better.”
- “This is great, can you make more for other subjects please?”
- “Wow, this was fantastic. I was able to look at it while I was on the train. Thanks”
- “Much better than the PDFs as I could listen to you explain it and add in comments as you completed the problems.”
- “Much more helpful then reading a text book!”
- “Didn't really help me out but it's a cool idea”
- “This helps so much! Looking forward to being able to watch more subjects.”
- “Much better than the PDFs as I could listen to you explain it and add in comments as you completed the problems.”
- “Gotta love technology, this is great!”
- “It's cool but I do better with a teacher so I can ask questions during the lesson.”
- “Would have been helpful if my computer was faster at loading the videos.”
Presentation in the LMS

Although learners can receive links to the pencasts, the project team has created a Dreamweaver template for the pencasts to be added to. This allows learners to view the pencasts in the online courses and read a little synopsis of the pencasts along with identifying what section of the book the pencast supports.
Resources

- Pencast Website
- Officeworks Online Store
- Livescribe - Getting Started

For more information

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