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Designing an interactive virtual learning environment (VLE) with a learner centered approach

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93 — Information literacy meets E-learning: let's talk about interconnections and outcomes — Information Literacy with E-learning Special Interest Group

Abstract

This paper shares the experience of developing an interactive virtual learning environment with a learner centered approach. The University of Auckland Library leads an institutional project to develop a compulsory academic integrity online course. In order to engage students in the learning process, the project has taken a learner centered approach by developing persona and conducting series of usability testing, from paper prototype, online prototype, pilot version and the final product.

Has e-learning enabled libraries to extend their reach to new populations? We conclude from our experience that without e-learning, it would be very difficult to develop and deliver this compulsory course for a very large student population (8,000+).

Introduction

Information literacy is using information to learn (Bruce, 2008). Academic integrity forms basis of information literacy as information literate person needs to fairly use and apply information with honesty and respect. In order to support students to use information to learn and to research effectively, academic libraries have a long history of contributing to information literacy education in higher education. As faculty recognise the importance of information literacy it has become challenging for academic libraries to teach more and more face to face information literacy classes. A growing trend is to provide a combination of face to face and online formats (Wang, 2010). Online learning materials and courses are

often delivered via institutional learning management systems or virtual learning environments. Self-paced learning is one of the key advantages of using a virtual learning environment, however, engaging learners and keeping them motivated is a significant challenge when designing self-paced online courses.

This paper shares the experience of the University of Auckland Library in developing an interactive online course to engage students in the learning process. The University of Auckland is the New Zealand's largest and highest ranked research university. There are 32,123 FTE students studying in eight faculties. In 2009, the University Teaching and Learning Quality Committee (TLQC) started exploring the issues regarding academic integrity. One aspect of academic integrity is to use information with understanding and acknowledges cultural, ethical, economic, legal, and social issues surrounding the use of information. Another respect of academic integrity is to reflect students' own learning by applying prior and new information to construct new concepts or create new understandings. These are all closely related to information literacy (Bundy, 2004).

As a member of TLQC and the TLQC Academic Integrity Working Group the University Library took a leading role in the discussions and planning. After university-wide consultation with faculties and other stakeholders it was approved that an academic integrity online course would be developed and that it would be compulsory for all undergraduates and postgraduate students who enroll for the first time in a University of Auckland academic programme.

The University Library volunteered to take on this project and was granted strategic development funding in August 2011 to lead the development of this online course. In order to engage students in the learning process, the project team has taken a learner centred approach by developing persona and conducting series of usability testing. The online course was planned in such a way that usability testing has been conducted during the entire design process: from paper prototype, online prototype of initial development of 2 modules, online prototype of all 5 modules, and pilot. Each time the users provided valuable feedback which informed the incremental redesign of the course site.

The three stages of developing the online course

Stage I – review of the literature and institutional guidelines and policies

In August 2011, a fulltime staff member was employed to work on the course content development. An Association University Librarian is the project owner. The Library Learning Service Manager was appointed part-time as the Project Manager. The project team consisted of one full-time member and one part-time member.

During the content development, all academic integrity related to university policy and guideline documents were consulted. These included: the *Academic honesty and plagiarism website*; *Guidelines: Conduct of Coursework*; *Use of Third Party Assistance in Undergraduate and Postgraduate Coursework*; *Guidelines: Conduct of Research*; *Guide to theses and dissertations*. All the key points related to academic integrity were collected and used as the key points in the course content development.

In addition to the University guidelines, the project team reviewed scholarly material and relevant tutorials and websites of other institutions. In September 2011, a project member

also attended the fifth Asia-Pacific Educational Integrity Conference in Perth, Australia (Gaynor, 2011, Lee & Partridge, 2011, Singh, 2011). The conference was timely and provided an excellent opportunity for a project team member to meet leading experts and people with similar interests. We gained an insight in how other institutions have developed, managed and supported their compulsory tutorials. Many related online tutorials were identified and are listed in Appendix 1.

Stage II – Content Development

Based on the review of the literature and the university policies and guidelines, the course content was developed with a scenario or story-based approach. The academic integrity course consists of an Introduction and five Modules:

Introduction

Module 1: Academic integrity at university

- 1.1 Graduate Profiles
- 1.2 What is academic integrity?
- 1.3 Understanding the academic environment

Module 2: Ensure your work fairly reflects your learning?

- 2.1 Examples of academic dishonesty
- 2.2 When working with fellow students...
- 2.3 When giving and getting help...

Module 3: Using & acknowledging the work of others

- 3.1 Quoting, paraphrasing and summarising
- 3.2 How to reference?
- 3.3 Avoid plagiarism

Module 4: Fair use of copyrighted material

- 4.1 What is copyright?
- 4.2 How to use copyright material?
- 4.3 What is Creative Commons

Module 5: Consequences of academic dishonesty at the University

- 5.1 What happened if someone is academic dishonesty?
- 5.2 What happened if someone cheats during an exam?

During the content development, seven Subject Matters Experts were identified who are academic staff from Arts, Business, Science, Medical and Health Sciences, and National Institute of Creative Arts and Industries faculties, as well as Student Learning support.

The project team has been constantly consulting with the Subject Matter Experts in faculties and service departments on the content, technology platform and administrative processes. Feedback has been very positive and useful. Content development has been iterative and based on:

- Ongoing review of new relevant web sites, online courses, scholarly and popular publications – interesting examples were obtained from the media.
- Ongoing review of university policies and guidelines.
- Feedback from Subject Matter Experts.

Stage III – Developing the course website

After the content was developed and reviewed, the project team started moving the content to a web environment. An academic staff member from the Computer Science department who is an expert in human and machine interface design and usability studies joined the project team. Under her guidance, the course website was designed with the student-centred approach by using results from usability testing throughout the entire course development.

Student-centred approach here means to design the course site by achieving the learning outcomes and meeting students' needs. In order to meet students need, first of all, we need to know and interact with students who are going to use the online course. This has been furnished many times in the seminal literature about interact students in the learning process (e.g. Freire, 1970; Vygotsky, 1978). For this online course design, we have developed personae and conducted a series of usability testing to understand our target students and therefore to design the course site based on their need.

1. Developing personae

By consulting with faculty members, Graduate Centre and library staff, the team developed four archetypical academic integrity course personae based on their envisaged attitudes and engagement with the course. In all design elements, the point of view of these personae is considered:

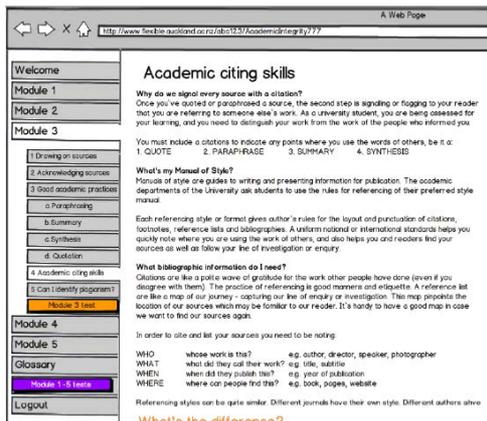
- Lisa, a 1st year undergraduate Kiwi (NZ local) student
- Jian, a 1st year undergraduate international student
- Niko, a Master international student
- Ursula, a Kiwi returning PhD student



These personae are also used as the key characters throughout the entire course development. In keeping with a student centred learning approach, the course site was designed by considering these personae's needs and conducting series of usability testing throughout the paper prototype and online prototype of the course site design.

1. Paper prototyping and usability testing

Based on the personae, a paper prototype for one module was developed using Balsamiq software as shown below:



Paper prototype using Balsamiq

Four students were invited to participate in the paper prototype usability testing. They were asked to complete several tasks by navigating the paper site. These tasks include:

- Pretend this is the website, where would you go to start to explore the site
- Will you go through module by module or click on the module that you are interested in
- Once you have clicked on module 3, what are you expecting to see?

The 1st round of usability testing provided useful and valuable feedback and informed the redesign of the course site.

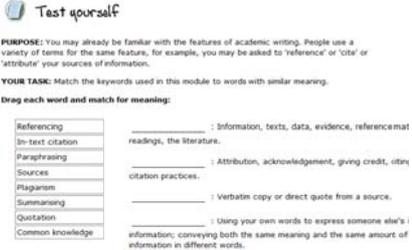
2. Online prototyping and usability testing

Based on the paper prototype, an online prototype was developed using CourseBuilder, which is a purpose-built course development tool, provided by the University's Centre for Academic Development (CAD). An E-Learning designer and webmaster from CAD have also joined the project team at this stage.

The University of Auckland uses a proprietary virtual learning environment of learning management system called Cecil. It is envisaged that the academic integrity course, developed in CourseBuilder, would be delivered via Cecil. Cecil has the functionality to host the question bank and to keep record of student test results. It also interfaces with institutional enrolment and records systems required for the management and administration of the full implementation of the course in 2013.

Several rounds of usability testing have been conducted before the Academic Integrity course is piloted with several academic courses in the second semester 2012.

The 2nd round of usability testing was conducted after a number of online activities were developed for Module 3. The participants represented the diverse study body and included international, local and mature students from different ethnic groups. Students with excellent and weak IT skills were also included. A screen action recording software (Morae) was used to record how students were executing different types of online activities and browsing the course site. The following questions were asked while they were browsing the course site:

Activities	Examples, screen shoot or comments	This is effective																								
Videos in Welcome section	E.g. VC's Video	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								
Cartoon dialogue	E.g.  <p>The Fatal Flaws go original!</p> <p>You need to paraphrase it's 99% perspiration</p>	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								
Multiple-choice testing (M3)	E.g. I can identify plagiarism after doing these exercises	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								
Drop and drag testing (M3)	E.g. Test yourself – Module 3  <p>PURPOSE: You may already be familiar with the features of academic writing. People use a variety of terms for the same feature, for example, you may be asked to 'reference' or 'cite' or 'attribute' your sources of information.</p> <p>YOUR TASK: Match the keywords used in this module to words with similar meaning.</p> <p>Drag each word and match for meaning:</p> <table border="0"> <tr> <td>Referencing</td> <td>:</td> <td>Information, texts, data, evidence, reference material, readings, the literature.</td> </tr> <tr> <td>In-text citation</td> <td>:</td> <td>Attribution, acknowledgement, giving credit, citing</td> </tr> <tr> <td>Paraphrasing</td> <td>:</td> <td>Verbatim copy or direct quote from a source.</td> </tr> <tr> <td>Sources</td> <td>:</td> <td>Using your own words to express someone else's information; conveying both the same meaning and the same amount of information in different words.</td> </tr> <tr> <td>Plagiarism</td> <td>:</td> <td></td> </tr> <tr> <td>Summarising</td> <td>:</td> <td></td> </tr> <tr> <td>Quotation</td> <td>:</td> <td></td> </tr> <tr> <td>Common knowledge</td> <td>:</td> <td></td> </tr> </table>	Referencing	:	Information, texts, data, evidence, reference material, readings, the literature.	In-text citation	:	Attribution, acknowledgement, giving credit, citing	Paraphrasing	:	Verbatim copy or direct quote from a source.	Sources	:	Using your own words to express someone else's information; conveying both the same meaning and the same amount of information in different words.	Plagiarism	:		Summarising	:		Quotation	:		Common knowledge	:		<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree
Referencing	:	Information, texts, data, evidence, reference material, readings, the literature.																								
In-text citation	:	Attribution, acknowledgement, giving credit, citing																								
Paraphrasing	:	Verbatim copy or direct quote from a source.																								
Sources	:	Using your own words to express someone else's information; conveying both the same meaning and the same amount of information in different words.																								
Plagiarism	:																									
Summarising	:																									
Quotation	:																									
Common knowledge	:																									
Sequencing task (M3)	E.g. The writing process  <p>Sequence</p> <p>Question: Order of typical steps taken to produce a piece of academic writing</p> <ol style="list-style-type: none"> 1. Find a topic 2. Analyse & outline 3. Research your assignment or topic 4. Research, read & make notes 5. Reflection & conclusion 6. Plan presentation 7. Plan & structure 	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								
Audio files	E.g. What is common knowledge?	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								
The order of the navigation bar (M3)	The structure or order of the topics	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree																								

Statements	The tutorial was fun	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree
Statements	The tutorial was boring	<input type="checkbox"/> Strong disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neither agree nor disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree

What do you like the best?

What can be improved?

The 2nd round of usability testing provided valuable information on the different types of activities and design issues, e.g. the drop drag activity was clunky and participants need instruction to do the activities; it took participants a while to open the accordions; no one clicked and viewed the VC's welcome video as they didn't feel they want to spend time on a video which is not included in the test. These findings informed the further course site design.



After the 2nd round of usability testing it became clear that more resource was required to complete all the complex tasks within the project time frames. The Learning Services team members joined the project team and started to develop online activities for all the modules. In order to determine students' preferred online activities, the 3rd round of usability testing was conducted after the activities for Module 2 & Module 3 were developed. This usability testing also provided an opportunity to observe if students found it easy to switch between the course site and the Cecil quiz site.

There were eight tasks and a few questions in 3rd usability testing round (see Appendix 2). This testing identifies many issues and some of them are listed below:

- Participants don't read text, they only scan the text and images but they were interested in doing the interactive exercises;
- None of the participants clicked and opened the accordions even after the accordion colour was changed;
- The team designed a few mouse-overs to provide more information for images but only one student clicked on the image and viewed the mouse over message, rest of students ignored the image mouse over;

- Students got confused with the Cecil quiz site and the course site. It is required to provide clear instructions on how to use the course site and quiz site and to improve navigation between the two sites;
- The mature student had a difficulty to complete the course activities due to poor IT skills.

The 3rd round of usability testing informed the course design very well and the remainders of the module activities were designed based on the feedback. For example, text in each section was reduced; comics or images were added to break up the sections of long text. More exercise activities were added for students to learn by doing. A hand symbol was added on the accordion to make it obvious for students to click and open

 The same images are used on the course content home page and the Cecil quiz site to ensure consistency of experience and branding.

After all the module online activities and module tests were developed, the 4th round of usability testing was conducted. The main purpose of this testing was to see how students would complete the required tests and also to determine the time requirement of the course. Five students participated in two parts of testing:

1. Three participants were asked to complete all the required module tests. Their key task was to pass all the module tests by achieving 100%. There was no requirement to work through all or parts of the online course, as long as they pass the test;
2. Two participants were asked to go through the online course so the team could observe how long it would take them to complete all the modules. They were also asked to think aloud and articulate which activities that they liked or disliked while they browse the course site. See Appendix 3 for the task questions for this round.

It was very interesting to find that all three students in part I chose to do the tests without doing the online course first. One student initially mistook the multiple online course exercises for the test. However, as soon as he realised he went to the test site directly. He managed to complete first three module tests obtaining 100%. However, when he could not get 100% for the other two modules, the student used Google and then the course site to learn and to answer the questions. The observation questions for this round are in Appendix 3.

The usability testing highlighted the need to design quality test questions and to provide feedback for all the questions so that students can use the test as a learning process. Navigation between the course site and the test site was a major issue for students and improvement were made accordingly.

True collaboration

The project team consists of content developers from the Library, an online usability expert from faculty, Subject Matters Experts from faculties and services department, a learning designer and Webmaster, experts for the institutional Learning Management system (Cecil), as well as the project manager and project owner. This collaboration provides a wide range of expertise critical to the success of the project. The project owner has identified the Subject Matters Experts from various faculties, provides regular progress reports to TLQC and liaises with the University enrollment and exam offices; The project manager liaises with the project owner, subject matters experts, the usability expert and the webmaster, plans course development strategy and sets deadlines and makes sure that the deadlines are met; the Subject Matters Experts provide contextualised feedback and advice on the content based on their disciplinary background and experience; the online usability expert

guides and supports the entire process of usability testing; the learning designer provides the learning design expertise while the Webmaster advises on the online design; Cecil experts provide support in Learning Management system. The content development team meets with the learning designers, the Webmaster and the usability expert regularly. The content development team meets every 2-3 days to discuss progress and share ideas and experience. Most decisions are made after the team discussion and are by mutual agreement. This is a true collaborative project.

E-learning tools used in this online course development

Many commercial, open-source and locally-developed online tools have been explored and used in this project. Examples are: Balsamiq (an online mock up tool), Morae (record and analyse students' on-screen activities), BBflashback (short videos), Captivate (more complex learning objects), GoAnimate (animated films), Bitstrips (comic strips), VoiceThreads (add voice and image to a presentation), CourseBuilder (an online learning platform), Peerwise (enable students to generate multiple choice questions online), Gliffy (generate diagrams) etc. The comparison of these tools is available in Appendix 4.

Conclusion

Institutional support for the project is strong and there is a great interest in the course from academic staff. Although it is aimed at new students it is expected that many lectures will use all or some of the modules in their second and higher year courses. The team expects that pilot will identify areas for refinement which will be addressed prior to the launch of the course in 2013.

One of the key questions asked for this conference is: has e-learning enabled libraries to extend their reach to new populations? From our experience of developing the online learning environment, we conclude that without e-learning, it would be very difficult to develop and deliver a compulsory course for a potentially very large number (8,000+) of new students each year at our university.

Course website: http://flexiblelearning.auckland.ac.nz/academic_integrity/

Appendices

Appendix 1: A list of most related online tutorials identified from this project

1. University of Adelaide, Australia	http://www.adelaide.edu.au/myuni/onlinelearning/learningmodules/avoidingPlagiarism/player.html
2. University of Victoria, Australia	http://tls.vu.edu.au/altc/videosite/index.html
3. University of Leicester, Australia	http://www2.le.ac.uk/offices/ssds/careers/ld/resources/study/plagiarism-tutorial
4. University of Technology Sydney	http://www.uts.edu.au/teachlearn/avoidingplagiarism/
5. UCLA, USA	http://www.library.ucla.edu/b Bruinsuccess/
6. University of Sydney	http://sydney.edu.au/library/elearning/learn/plagiarism/index.php
7. University of Lycoming, USA	http://www.lycoming.edu/library/instruction/tutorials/plagiarismGame.aspx
6. Princeton, USA	http://www.princeton.edu/pr/pub/integrity/pages/intro/index.htm
8. University of Ryerson, CA	http://www.ryerson.ca/academicintegrity/
10. University of York, UK	http://www.york.ac.uk/k-roy/index.htm
11. IPO, UK	http://www.ipo.gov.uk/types/copy/c-quiz.htm
12. Copyright council NZ	http://www.copyright.org.nz/
13. University of Colorado, USA	http://ucblibraries.colorado.edu/copyright/

Appendix 2: Usability testing tasks – round 3

1. Task 1

You heard that you have to complete this online course, but you only have 5 minutes now. You would like to see what the course is about. Please look at the home page of the course and tell us the purpose of this course and why you need to do it. (Please think aloud and tell us).

2. Task 2

Now, you understand the purpose of the course. As a UoA student, you have to pass the test, where would you start? (Please think aloud and tell us).

- 1) Do the final test directly – then think aloud where to start to do the final test
- 2) Do the module test directly - then think aloud where to start to do the module test?
- 3) Work through each module and do module test

Work through the whole course and then do the final test at the end.

3. Task 3

You decide to start from Module 1 and do the module 1 test. Please work through module 1 step by step, complete all the activities and answer all the questions, and the module test. (Please think aloud)

4. Task 4

You have a bit more time left and would like to continue to do Module 2. Please work through module 2 step by step, complete all the activities and answer all the questions, don't have time to do module test. (Please think aloud)

5. Task 5

You have a few minutes left so you would like to see what module 3 & 4 are about so you can continue to do them next time. Please think aloud what module 3 and module 4 are about.

6. Task 6

After having gone through the course site, you still want to get some help in person, how would you find help available from the course site?

7. Task 7

Look at the avoid plagiarism video in Module 3 and think aloud what you have learnt from this video. Please try and answer a question 'Which of the following statements is true?'

8. Task 8

What are the possible consequences if someone is academically dishonest? (Please think aloud)

9. Post questions

- Did you learn something new?
- Please tell me your initial impressions about the layout of this page and what you think of the colours, graphics, photos, etc.
- What are your overall impressions of the course?
- What are the three activities you like the best?
- What are the three activities you like the least?
- Do the module headings reflect the content?
- Is it easy to navigate the course site?
- Do you find it is easy to switch between the quiz site and the course site?
- If you could make one significant change to this course site, what change would you make?

Appendix 3: Usability testing tasks – round 4

1. Task 1

Please look at the course introduction and tell us what the **purpose** of this course is, & what **you need to do** in order to complete it. (Please **think aloud and tell us**).

2. Task 2

You decide to start from Module 1. Please work through Module 1 step by step, complete **all the activities** and **answer all the questions**.

Please **think aloud & talk to us** by answering the question below:

- What have you learnt from this module?
- What do you like the best about this module?
- What do you dislike about this module?
- Are the comics easy to follow? Do they make sense to you?
- Any improvement?

3. Task 3

You would like to do Module 2 now. Please work through Module 2 step by step, complete **all the activities** and **answer all the questions**.

Please **think aloud & talk to us** by answering the question below:

- What have you learnt from this module?
- What do you like the best about this module?
- What do you dislike about this module?
- Are the comics easy to follow? Do they make sense to you?
- Any improvement?

4. Task 4

You would like to do Module 3 now. Please work through Module 3 step by step, complete **all the activities** and **answer all the questions**.

Please **think aloud & talk to us** by answering the question below:

- What have you learnt from this module?
- What do you like the best about this module?
- What do you dislike about this module?
- Are the comics easy to follow? Do they make sense to you?
- Any improvement?

5. Task 5

You would like to do Module 4 now. Please work through Module 4 step by step, complete **all the activities** and **answer all the questions**.

Please **think aloud & talk to us** by answering the question below:

- What have you learnt from this module?
- What do you like the best about this module?
- What do you dislike about this module?
- Are the comics easy to follow? Do they make sense to you?
- Any improvement?

6. Task 6

You would like to do Module 5 now. Please work through Module 5 step by step, complete **all the activities** and **answer all the questions**.

Please **think aloud & talk to us** by answering the question below:

- What have you learnt from this module?
- What do you like the best about this module?
- What do you dislike about this module?
- Are the comics easy to follow? Do they make sense to you?
- Any improvement?

7. Post questions

- 1) Please tell me your initial impressions about the layout of this course and what you think of the colours, graphics, photos, etc.
- 2) What are your overall impressions of the course?
- 3) Do the module headings reflect the content?
- 4) Is it easy to navigate the course site?
- 5) If you could make one significant change to this course site, what change would you make?
- 6) Did you learn something useful?
- 7) Is the course content too much or just about right?

Appendix 4: The online tools used in this project

Tools	Use for	Website
1. Gliffy	Developing diagrams	www.gliffy.com/
2. Balsamiq	Paper prototyping	www.balsamiq.com/
3. BitStrips	Drafting comic	www.bitstrips.com
4. GoAnimate	Drafting animation	goanimate.com
5. Morae	Recording screen actions	http://www.techsmith.com/morae.html
6. Rage Comics	Drafting comic	http://ragecomics.memebase.com/
7. Xtranormal	Drafting animation	www.xtranormal.com
8. Photoshop	Editing images, creating testing	http://www.adobe.com/nz/products/photoshop.html
9. BBFlashBack	Creating short videos	http://www.bbsoftware.co.uk/BBFlashBack.aspx
10. Dragster 3	Drag and drop, but Flash file	http://www.webducate.net/products/dragster/
11. Captivate	Moving learning objects	http://www.adobe.com/products/captivate.html
12. Raptivity	Many, including PPT to HTML5	http://www.raptivity.com/
13. HTML5Point	PPT to HTML5	http://www.digitalofficepro.com/powerpoint/powerpoint-to-html5-converter.html
14. Ispring	PPT to flash presentation	http://www.ispringsolutions.com/
15. Morguefile	Free stock photography	http://morguefile.com
16. Symbaloo	Arranging desk top bookmarks	http://symbaloo.com
17. Kozzi	Download royalty-free photos and illustrations	http://www.kozzi.com/

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