ACETS Exemplar 22

Respiratory Function

Patricia Warren

University of Edinburgh

ACETS Exemplar 22: **Baseline Survey**

1	Teacher/academic's name	Dr Patricia M Warren
2	Teacher/academic's position	Senior Lecturer, Medical Teaching Organisation
3	Teacher/academic's institution	University of Edinburgh
4	Range of subjects taught	Physiology
5	Contact information	p.warren@ed.ac.uk
6	Principal interest	Respiratory physiology
7	ACETS Officer	Erin Mills
8	Date of survey	17.06.05
9	Do you know how to make web pages?	Yes
10	Have you used the web in your teaching?	extensively
11	Do you use anything that you would consider a 'learning object' in your teaching?	Yes
12	How would you rate your own computing skills against those of your colleagues?	Good
13	How would you rate your own teaching skills against those of your colleagues?	Good
14	How would you rate your own use of CAL against those of your colleagues?	Very good
15	How much relevant staff development and training is available?	Training is available for use of standard software and Web page construction.
16	How much relevant staff development have you actually made use of?	As required to complete tasks or use specific software
17	Do you have access to support in making electronic learning materials?	Yes
18	Is this available as a free service?	To some extent.
19	Have you made use of this support service before?	Yes
20	Would you expect that you would need to use this service to use learning objects in your teaching?	Yes
21	Do you have a VLE (or equivalent) available to support your work?	Yes
22	What is the system called (eg WebCT, or equivalent local system name)?	Edinburgh Electronic Medical Curriculum
23	Does it allow you to put teaching/learning materials online for your students	Yes
24	If so, do you do this or is it done centrally for you?	Both
25	How easy is it for you to get teaching materials online?	Easy and rapid process
26	Do you have your own computer at work	Yes
27	Do you use a computer at home for work	Yes
28	What level of computer access do you think your students have in the institution and at home	There are numerous open-access computer labs each housing large numbers of computers on all campuses within the University including halls of residence. A high proportion of students have their own computer at home.
29	How much of this is internet-enabled ?	All computer labs have internet access and a large proportion of students have internet access at home.
30	How much teaching and learning materials are provided online for the students	Most modules are supported by some online resources and more are being produced in response to students

		demand.
31	To what degree do you expect the use of learning objects to enhance your teaching	I expect learning objects to enhance my teaching substantially.
32	To what degree do you expect the use of learning objects to enhance your students learning	I have documented evidence that use of CAL programs improves student performance in summative assessment. In addition, students demand for more resources suggests that they find such material enhances their learning.
33	To what degree do you expect the use of learning objects to make your work easier	I don't necessarily expect it to make my work easier: development of electronic resources simply replaces development of paper-based resources (workbooks, etc). However, it enhances the quality of the material available to the students.
34	Extra notes	I consider that electronic learning objects are simply one tool that is available for enhancing teaching. I think it is important to remember that not all students will find this medium helpful and not all staff will find it enhances their particular style of teaching. Enthusiasts for using this medium should be encouraged (preferably by having adequate financial resources to produce material not otherwise available without having to do it on a shoe-string in their own time). Equally, teaching staff should not feel obliged to use this tool. Better search engines are need to access to existing resources.

ACETS Exemplar 22: **Interview**

Exemplifier	Patricia Warren
Exemplar description	A stand alone program designed to describe respiratory function testing for medical, science, physiotherapy and nursing students.
Interviewer	Erin Mills
Date and location of interview	Friday June 17th, University of Edinburgh, School of Medicine, Teviot Place.
Context of use	As a revision package to accompany existing lectures largely for second year students and 1st year medical students in my case, although is also designed for use by undergraduate nurses and physiotherapists. It has not yet been evaluated because it is only just finished, but will be used in the next academic cycle. It will accompany a module, as I generally use this type of resource to back up the lecture. Students are told that the resource is available in the same way in which they are given a reading list. Part of the program is designed to be used in a practical class but this would require computers to be available in the laboratory and we have not yet got these arrangements in place.. At the moment it's on a CD but the plan is to upload it onto a Web-based VLE. Copies of the CD will also be placed in the Clinical Skills Resource Centres so that medical students can use the program for self-directed study to refresh their memories on technique followed by a practice session using the relevant equipment. If they wish to have their own CD it has been introduced commercially which they could buy it, but I don't see any student doing that.
How did you go about putting the exemplar together? Was it hard to design and/or conceptualise your exemplar?	It started because, a colleague (DD) asked me to update an existing program which he had authored and which had been written in DOS. It was very static with few interactions and the graphics were poor. He wanted to update it and asked me if I would interested in updating it because he knew I had expertise in Respiratory Function Testing. The job hung around for a while because he wanted it updated for use by physiotherapists and nurses students. I don't teach that group and felt that, if I was putting a lot of energy into it, and it would need to be modified so that it would be useful for my science and medical classes. This meant that the content had to be enhanced. This led to some discussion because the original author didn't want the theoretical content to be in too great a depth. After some discussion we agreed that with modern technology you can actually have a many layered system so that people can take it to any level they want and discount the material that is not appropriate to their learning objectives. It wasn't difficult to conceptualize the program because I had already written a fairly sophisticated program which accompanies the Year 1 module for the medics, so I had already had experience with producing this type of material. In the end I decided to keep the basic content of the original program but to present it in a different way and expand it.
How did you approach this work? How quickly were you able to come up with the activity design?	This is a terrible admission, I find it difficult to read on a screen! The initial program was not large so I simply printed it all out and laid everything out on the floor. I use large sheets of paper and coloured pens to design the taxonomy. Because this type of medium is almost 3 dimensional I find it difficult to hold the structure in my head. I therefore can lay it out and draw connecting lines to indicate the links. This can then be condensed it down to an A4 sheet which I can hand to my programmer and they then have a structure for the software. The program consists of three sections: a tutorial containing the scientific background of the tests, a section on methodology, and a final section on test interpretation. Each section contains videos, animations and illustrations. Each section has a drop-down menu which allows the user to select the required section without having to work through the entire CAL from beginning to end. At the end of each section there are multiple choice questions with immediate feedback and running total of the score so that students can assess on the spot. The animations are themselves reusable learning objects; I can extract them and use them within a PowerPoint lecture. Any animations I would draw using PowerPoint as a series of cartoons before giving them to the learning technologist (JA) to create the animation using Flash. I would prepare the text as a Word document.
Was the kind of activity something the students were familiar with?	The medical students are very familiar with this type of resource and, in fact, are clamouring for more and more CALS because they find them useful tools, for revisions and for clarification of lecture material. In Medicine we have a policy that these resources are used in a blended way so that they reinforce the formal teaching. Instead of perhaps just giving a textbook reference, we might give them a CAL url. Science students I think are less familiar with this type of activity. I don't think it's hit that culture in the same way, but it obviously will in the near future.
How did you find/identify your third-party materials?	The author of the original program pointed me to other relevant material. However, this need to be amended so that it was appropriate for the intended audience for this CAL.
Did you use ACETS listed links and sources?	No. I don't think that it's well publicized enough. Possibly there is more now, but perhaps there wasn't when I was doing this.

Did you look at/use JISC sources?	No, I didn't use this either.
Did you use commercial sources?	No.
Did you have to get clearance/permission to use the third party materials?	No.
How did you go about getting clearance and with what success?	n/a
Was the exemplar easy to put together?	Yes, bearing in mind that I had previous experience. The first one takes you a long time and then you get into it. The down side of preparing several CALs is that you can get into an intellectual rut: when you first start everything is new, and you have an open mind on what the technology can do. The tendency is then to use the same thing over and over again and I have found that, if I am not careful, I stop experimenting with the medium.
What tools did you use?	My lecture notes, PowerPoint, Word and the learning technologist used Flash.
Did you get any help?	The technologist (JA) did all the technical side and I simply wrote the content. I have to say that it is very important to have an able IT person. JA was invaluable. She has specific knowledge of the medium regarding what will work in animations and layout. We actually worked together on the presentation. She had a lot of input, and provided invaluable content advice and layout advice. It is important to remember that learning technologists are experts in their field and can contribute enormously to ensuring that the final presentation of the material is as professional as possible.
Were you pushing your skills in doing this?	No, because I had already done a similar program for the first year medical students. You obviously learn something from everything, but I wasn't frantically pushed to learn new skills in order to do this.
Did you use pre-existing services/tools?	Yes.
Did you engage with colleagues in your own working context?	Not really, this particular CAL was a solo effort. DD had asked me to revise the program which I did. He then ran the 'final draft' of the program. This an important process as someone who has not been intimately involved in the production can more easily spot areas where there are problems, for example, where the navigation is not intuitive.
Would that be the normal way you work?	No, normally they are very collaborative. The first CAL I produced was a big multi-disciplinary package for first year medics and involved 8 academics. The nature of the package, this one is on basic respiratory functions which is one of my particular areas of expertise, so I didn't need to bring anyone else in.
Did you engage with the ACETS project or X4L programme?	No.
Did you engage with other external bodies?	No, it was a solo project.
Was the exemplar easy to deliver/use?	Yes, I think it is very straightforward, it's a self-contained CAL with very clear menus and easy to navigate.
Did it give pedagogical benefit	Yes, as it enables students who have missed something in a lecture to go back to the topic. It is different to using a textbook as you can sit with a textbook and not engage with it. It is more likely that students will engage with a CAL program as it is interactive: they are not just reading text, there are animations, experiments they can do on the page, and self-testing questions with immediate feedback. The more interaction you have then the greater the chance of retention and uptake of knowledge, and it really simply does repeat and reinforce large sections that are given during lectures.
Have you evaluated it?	Not yet.
Has this enhanced your teaching? In what way?	It's really designed to back up to teaching, but it could be used as a stand-alone resource.

Has this enhanced your students learning? In what way?	I would like to think that using it makes it more engaging for the students since learning should be a dynamic and vibrant activity, not dreary.
Can you report back on the success of this assessment?	n/a
How important was it that you were able to get hold of third party materials to use in your teaching?	If someone has already produced good material then I see no reason to recreate it. However, I find it difficult to locate suitable material.
Has the use of learning objects made your work easier?	I don't think it's made it easier, just enhanced it. Using animations is helpful in getting a point across and CALs allow students to study at their own pace and self-test their knowledge. However, the amount of work involved in producing a CAL is substantial.
Would you do it again?	Oh yes, most definitely, I've already done another CAL since completing this one.
Was it hard to adapt materials or teaching practices to do this?	It wasn't difficult especially since my subject, respiratory physiology, is basically a dynamic subject which is easily animated.
Has this changed your practice?	This particular CAL hasn't, but my first one did. We produced a series of CALS that are Web based and are released in real time alongside the lectures. This changes your practice because the two media (formal lecture and CAL) have to complement each other. We have also experimented with giving the students an interactive CAL based on material which had previously been in a workbook. They were told they had to complete by a specific date. If they had questions from it, they were told to put them onto an electronic notice board and the expert then gave a 'Question & Answer' session to the class as a whole. This reduced the staffing required and encouraged self-directed learning. So yes, use of this type of material has changed my practice.
Any other points or comments?	Personally I am now a 'CALophile'! For me this medium has so much potential, and I have only scratched the surface of the potential. Interestingly, we do have students for whom use of CALs does not work for whatever reason: they might be technophobes or the visual interactive format may not suite their learning style. I suspect we will always have a small proportion of such students. However, if we deliver it in a Web-based format we can see who is using it. From this information and from the comments on the electronic notice boards, it's always the top students - they seem to go for every resource they can find, books, CALS, whatever... It's the lower end of the class that tend not to use it. In addition students are requesting more CALS particularly as revision tools.

ACETS Exemplar 22: **Reflective Diary**

In this case the material found me: I was asked if I would be willing to update a program previously co-authored by a colleague. The original CAL program 'Chest Clinic' described the methodology and interpretation of respiratory function tests and had been designed for use by nurses and physiotherapists. The existing CAL had been written in DOS and the graphics were, therefore, very dated.

Step 1: Agreeing a remit with a colleague *(without coming to blows and with everyone thinking they have got their own way).* I felt that the material was very limited and that, if I was going to put considerable time and effort into this project, it had to support my own teaching of predominantly medical and basic science students, as well as being appropriate for the original clientele of nurses and physiotherapists. As such, I wanted to include more theory of the basic science behind the tests (for medical and science students) as well as the details of the techniques of executing the tests and interpreting the findings (for medical, physiotherapists, nurses). This was resolved by the fact that, with modern software, material can be presented at several levels using drop-down menus thus allowing the user to access material at an appropriate level to their course requirements whilst encouraging any student to explore the topic to a deeper level if they wished.

Starting from an existing program raises the issue 'Is there any point in re-designing existing material?' The answer was a clear 'yes' for the following reasons:

1. The existing program in DOS was very static and provided limited interaction between user and resource. Evidence from educational research suggests that learning is enhanced by interaction and by maximising the modes of interaction (visual animations, spoken dialogue, on-line formative assessment). Changes in technology are constantly increasing the ways that interaction can be provided.
2. The material could be updated to include current concepts and practice guidelines.
3. The material could be designed so that it can be delivered in a blended manner with my own teaching and, if the program was carefully structured in modules, could be adapted by other lecturers to fit their own specific needs.

Step 2: Finding out what was in the existing program.

I find it very difficult to remember the contents of someone else's program simply by looking at it on screen. I started by printing a hardcopy of each page (probably a cardinal sin in IT terms) in order to determine the details and order of presentation of the existing material. The program consisted of an introduction containing limited description of the theory of the tests, a section for each individual test with text describing the practical technique, a section showing the expected normal results for each test, 5 cases giving patient clinical details and test results for the user to interpret.

Step 3: Redesigning the structure of program.

The first consideration was the additions / amendments required for the program to be of use to current medical and science students in Edinburgh. These were based on the learning objectives for the relevant courses and were:

1. additional theoretical information about the tests and related material (disease processes, therapeutic drug action).
2. inclusion of other tests that are now used routinely in clinical practice (the original program was written in the 1980s and reflected the standard tests of that time).
3. animations to illustrate dynamic processes.
4. video clips to demonstrate the precise technique for performing some of the basic tests which are taught and assessed as clinical skills in the medical curriculum.
5. the facility for the program to be used in conjunction with practical classes.
6. self-assessment tests on both theory and practical components providing marks and instantaneous feedback.
7. more detailed and rigorous questions on interpretation of test results.
8. other resources (look-up Glossary, RLOs previously developed for other respiratory CALs consisting of electronic experiments and animated explanations).

Using my customary approach for designing e-learning material (large sheets of paper and multiple coloured pens), I constructed a flow-chart of the proposed program indicating the design, required links, and content

of the program. Then it was time for advice from the professionals on how (whether) my scheme could be translated into electronic format.

Step 4: Creating the content.

First of all, find an highly competent learning technologist with a flare for design (and an unflagging tolerance of academics who constantly change their mind about the content). Fortunately, in this case, grant funding provided such a paragon (JA) to help with updating the CAL. At the initial discussion we decide that the CAL would consist of three main sections (tutorial, methodology, case studies) with drop-down menus allowing sub-sections sections to be accessed without users having to track in a linear fashion from beginning to end throughout the entire CAL. This approach also allows students both to (a) revisit sections easily and (b) omit sections not relevant to their course. Agreeing an overall structure allowed JA to work on creating electronic placeholders and insert the material from the existing CAL whilst I created the additional scientific content. This also had the advantage that, generally, neither of us were held up waiting for the other to produce material. Since the program did not have to be produced in a linear fashion, I could provide JA with either (a) a large amount of simple material which I could produce rapidly to be slotted into various parts of the program, or (b) material for a single complex Flash diagram which would keep her occupied for weeks.

The various the additions / amendments to the existing material were dealt with as follows:

1. Additional theoretical information about the tests and related material (disease processes, therapeutic drug action): *I produced diagrams, graphs, text using hand-drawn diagrams, Word, or PowerPoint and these were converted into the appropriate format (text, animated Flash diagrams) by JA. This enhanced the existing software by introducing animations and incorporating diagrams which require interaction by the learner.*
2. Inclusion of other tests that are used routinely in clinical practice: *As for (2) above)*
3. Animations to illustrate dynamic processes *I designed these as a series of cartoons using PowerPoint which JA then converted into Flash animations.*
4. Video clips to demonstrate the precise technique for performing some of the basic tests which are taught and assessed as clinical skills in the medical curriculum: *Audiovisual clips illustrating techniques for performing simple respiratory function tests were recorded by a learning technologist using a hand-held digital video camera in the Clinical Skills Centre of the local teaching hospital for insertion into the CAL.*
5. The facility for the program to be used in conjunction with practical classes: *JA developed software which allows students to enter measurements of respiratory function obtained in a laboratory practical class and look-up tables to allow them to determine their own reference values based on own gender, age, and height. This enhanced the existing software which simply allowed students to look at a representative set of data from a single healthy individual.*
6. Self-assessment tests on both theory and practical components providing marks and instantaneous feedback: *JA developed software based on an approach used locally to provide self-assessment questions with instantaneous feedback and a running total of the score obtained. Question formats included short essay questions (requiring the user to type a short answer and compare with a specimen answer), 'drag-and-drop', multiple choice (true/false/don't know), and selection of two correct answers from a choice of five.*
7. More detailed and rigorous questions on interpretation of test results: *Multiple choice questions with instantaneous feedback were used to provide students with formative feedback on their ability to interpret clinical data..*
8. Other resources (look-up Glossary, RLOs previously developed for other respiratory CALs consisting of electronic experiments and animated explanations): *A look-up Glossary was included to allow the user to access definitions of terminology at any point in the program.*

Step 5: Using the program. The program has only recently been completed. It will be made available to medical students on CD in the Clinical Skills Teaching Resource Centres in the local teaching hospitals and loaded on the computers in the University Open Access Computer systems for both medical and science students. Use of the CAL by students taking the Respiration Module of the Year 2 Human and Mammalian Physiology (HMP) Course will be evaluated on completion of the module in November. Use in the HMP respiration practical is currently being investigated.

Step 6: reporting and closure

The main points learnt from the exercise:

1. Developing this CAL highlighted the fact that if such programs are made from multiple stand-alone components, then these rapidly provide a bank of RLOs which can be imported into other programs or used within PowerPoint lecture presentations thus increasing the cost-effectiveness of producing such material.
2. Producing the academic content of e-learning material gets easier and faster the more I do. However it does result in the tendency to reuse previous well-tried and easily produced formats without reconsidering the facilities available with an electronic medium for an innovative approach to presenting material.
3. It is essential to have regular meetings between academic and learning technologist and set mutual deadlines in order to keep the impetus going and prevent either going too far down an erroneous and blind alley.
4. It is important to have a good collaborative relationship with the learning technologist as they understand the medium and can provide invaluable advice on ways of presenting material.
5. If audiovisual material is to be produced for inclusion it is essential that fully-trained qualified audiovisual technicians with appropriate lighting/recording equipment are employed to produce high quality video material otherwise it tends to look like a home video and detracts from the otherwise high-quality graphics.
6. It is important to get someone from outside the development team to road-test the product for onscreen instructions / layout which look blindingly obvious to the writers but are counter-intuitive for subsequent users.

ACETS Exemplar 22: **Semi-structured Learning Design Statement**

Learning Design Name:	Respiratory Function
Learning Designer(s):	Patricia Warren
Institution(s):	University of Edinburgh
Course Context(s):	Medical and Science students.
ACETS exemplar ID:	22
LD period:	Used alongside lectures, for first year and second year medical, science, physiotherapy or nursing students.
LD duration:	The entire program probably contains about 2 hours worth of material. However, it is broken down into small sections, each of which would probably take about 10-15 minutes. There is also a section that can be used within a practical class.

In order to attain the following learning objective(s):	*Specific learning objectives*	To understand the theoretical and scientific background behind basic respiratory function tests that are used routinely in hospital laboratories. In addition, the precise techniques as defined by the American Thoracic Society are described and used in demonstrations so that medical students or nurses in particular can check their technique for making the measurements. The final aim is interpretation of the data obtained from the tests in the context of a clinical scenario.	
	General learning outcomes	At the end they should be able to describe the scientific basis for the test, perform the tests, and interpret the data.	
With prerequisite(s):	Medical, science, nursing and physiotherapy students with Scottish Higher or A level biology.		
Trigger(s):	To enhance lectures or practical classes		
The following persons/roles: (student and staff roles)	*Name*	*Type (staff, student)*	*Description*
	Student learner (SL)	Student	Medical, science, physiotherapy, nursing students
	Subject expert (SE)	Anyone involved in teaching respiratory physiology (lecturers, a tutors, demonstrators in a practical class)	
Perform:	*Which roles?*	*Do what?*	*How?*
Learning activity(s):	SL	Use the **program LO** for consolidation of, and reflection about, material presented in formal teaching both in lectures and practical classes.	By working through the **program LO** either in a sequential or selective manner.
Support activity(s):	SL	Unless used during the practical classes, the **program LO** is designed for independent, self-directed study.	
Using environment(s) or scenario(s):	All	On home computers or computer laboratories.	Either by providing the program on CD or by loading a Web-based version onto a VLE.
Using:	*Which roles?*	*Use what?*	*To do what?*
Tool object(s):	All	Web-enabled computers if using the VLE, offline if using the CD-ROM	
Knowledge object(s):	All	**program LO** : videos, images, clips, photographs, text	
Test object(s):	SL	Students can use the **program LO** to evaluate their knowledge by	

		answering questions at the end of each section.	
Search service(s):	None, not yet.		
Communicate service(s):	No, not yet, but if there were it would be within existing general facilities.		
Announce service(s):	Electronic notice boards, in lectures or in study guides given out at start of courses.		
Other elements or notes:	Current plan is to make it available to 250 first year medical students and 350 2nd year science students each year (all undergraduates)		

Completion Survey

Recorder:	Erin Mills
Date:	June 17th, 2005