



Using wireless technologies for context sensitive education and training

WP5 Art Gallery and Museum Education

Evaluation Report

London Metropolitan University

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Summary

The main focus of this document is to evaluate the work conducted in CONTSENS Work Package 5, Art Gallery and Museum Education, at London Metropolitan University and the conclusions that can be drawn from it.

User evaluation

Evaluation methodology

10 users used the software in the field at Fountains Abbey. Afterwards they each completed a questionnaire. The photographs below were taken during the trial.





Evaluation results

10 questionnaires were completed.

The user group

6 of the users were students taking a masters course in Landscape Archaeology, and 1 a masters in European Prehistory. 3 were members teaching or support staff.

Formal/informal educational context and previous knowledge of users

- 1: Degree BSc in Human and Natural Environments. At present I am on a MA in Landscape Arch course.
- 2: History degree/MA Landscape Archaeology.
- 3: BA History/Archaeology/MA Landscape Archaeology.
- 4: Master's student
- 5: BA (Hons) Ancient and Medieval History. 7 years working full time (mainly university administration).
- 6: Computer support in archaeology.
- 8: PhD Archaeology but not in this particular field so not a subject expert by any means.
- 9: Member of staff and 3 years an archaeologist with a research interest in medieval monasteries (not Cistercian though) and I bring a field trip to Fountains once or twice a year with students.
- 10: I am studying for an MA in European Prehistory. I was interested in the use of this technology to enhance the viewing of cave art.

Individual training needs

- 1: I was asked to attend this training day by my course director.
- 2: Getting involved in a learning experience with the possibility of analysing a past site with modern technology.
- 3: Information within archaeological context.
- 4: Learning about a site
- 5: Current - MA Landscape Archaeology (part-time)
- 6: Yes
- 8: Motivation - coming at this more out of interest in the technology really.
- 9: As an archaeologist I typically work on architecture and related art history - so the idea of a multifaceted package which could allow a user to run "randomly" between subjects interests me ... intelligent learning packages which respond to people with needs within a particular subject area but then allow them to push these boundaries and develop their activity beyond this really ensures the technology provides opportunities way beyond the usual paper-based handout.

Of the 8 users that responded, each expressed their individual training needs. 3 mentioned an interest in experiencing training using new technologies.

Expected outcomes

- 1: I expected not to enjoy it or be able to do it as I am not very technologically minded - however it turned out fine and I enjoyed it afterall! Good work I say!

2: I expected to use some GPS and learning videos, but it was a much broader experience. Good work I say

3: Helping create a new/interesting way to learn. Harnessing new technologies for heritage management.

4: Using new technology/software. Not much prior info given I'm afraid.

5: Was unsure what today entailed but was interested to experience the use of a new technology for use in archaeology.

6: I learn a job.

8: Was generally keen to see the technology in action.

9: Medieval monasteries, the English landscape, learning something new (rather than conveying what I know to others). Rain. I expected the material to be more text-based, i.e. an electronic handout. However it was not like that at all and looks much more useful.

10: I worked as a tour guide a Crewell Crags Heritage Centre and there may be a case for using more technical support there.

4 users make comments about being interested in using new technologies:

- “Harnessing new technologies for heritage management.”
- “Using new technology/software.”
- “was interested to experience the use of a new technology for use in archaeology”
- “Was generally keen to see the technology in action.”

Gender

| | Frequency | Percent |
|---------|-----------|---------|
| Valid F | 3 | 30 |
| M | 7 | 70 |
| Total | 10 | 100 |

Age

| | Frequency | Percent |
|-------------|-----------|---------|
| Valid 18-20 | 0 | 0 |
| 21-25 | 4 | 40 |
| 26-30 | 2 | 20 |
| 31-35 | 0 | 0 |
| 36-45 | 2 | 20 |
| Over 40 | 2 | 20 |
| Total | 10 | 100 |

1 Which mobile phone do you own?

Nokia
 Samsung Z
 Sony Ericsson K800i
 Nokia rubberised one
 Nokia
 Nokia N95
 Nokia N95
 Nokia E66

2 Does your phone have GPS?

| | | Frequency | Percent |
|-------|------------|-----------|---------|
| Valid | Don't know | 1 | 10 |
| | No | 6 | 60 |
| | Yes | 3 | 30 |
| | Total | 10 | 100 |

3 How would you rate your experience in using mobile phones?

| | | Frequency | Percent |
|-------|------------------|-----------|---------|
| Valid | Very experienced | 2 | 20 |
| | Experienced | 8 | 80 |
| | Not experienced | 0 | 0 |
| | Total | 10 | 100 |

The questionnaire results

4 What did you think of the mobile learning course you have just experienced?

N.B. Each respondent's comments are numbered so that comments made by individuals can be tracked across the different questions in the questionnaire.

- 1: It was much better than I thought it was going to be - and more fun!
- 2: I enjoyed it. It should be enhanced by a wider walk around the place. Probably with oral comments as well.
- 3: The course was interesting and easy to understand. The information was clearly presented and informative about the site.
- 4: Good idea.
- 5: The course was very interesting and clearly has potential for development. The technology worked well and the equipment was easy to use and instructions easy to follow.
- 6: Good!
- 7: Fantastic experience. Great seeing the reconstructions in situ.
- 8: Very stimulating - lots of good ideas.
- 9: Very interesting. The package today was slow but the potential of carrying such content onto site to have great possibilities.

5 How would you rate its usefulness in learning the subject?

| | | Frequency | Percent |
|-------|------------------|-----------|---------|
| Valid | Extremely useful | 2 | 20 |
| | Useful | 6 | 60 |

| | | |
|---------------------|----|-----|
| Uncertain | 2 | 20 |
| Not useful | 0 | 0 |
| Extremely un-useful | 0 | 0 |
| Total | 10 | 100 |

Average: 2.00

6 It was easy to use the equipment.

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 0 | 0 |
| Agree | 8 | 80 |
| Uncertain | 2 | 20 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 2.20

7 It was easy to navigate through content.

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 0 | 0 |
| Agree | 7 | 70 |
| Uncertain | 2 | 20 |
| Disagree | 1 | 10 |
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 2.40

8 The mobile learning experience was fun

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 4 | 40 |
| Agree | 4 | 40 |
| Uncertain | 2 | 20 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 1.80

9 I would take another mobile learning course if it was relevant to my learning needs.

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 5 | 50 |
| Agree | 4 | 40 |
| Uncertain | 1 | 10 |
| Disagree | 0 | 0 |

| | | |
|-------------------|----|-----|
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 1.60

10 I would recommend mobile learning as a method of study to others.

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 2 | 20 |
| Agree | 7 | 70 |
| Uncertain | 1 | 10 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 1.90

11 The mobile device enhanced the learning experience.

| | Frequency | Percent |
|----------------------|-----------|---------|
| Valid Strongly agree | 3 | 30 |
| Agree | 3 | 30 |
| Uncertain | 4 | 40 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| Total | 10 | 100 |

Average: 2.10

12 In what ways did it (or did not) enhance the learning experience?

- 1: The reconstruction videos brought the abbey to life which was very useful. Also, filming the blogs made us think about what we were looking at in more detail.
- 2: It is strongly useful for the reconstruction of the abbey. It permits a broader audience to figure out the former view of the place. On the other hand, the archaeological and historical explanation is very short.
- 3: I learnt facts I did not previously know about the site but felt constantly looking at the interface distracted from observing the feature itself.
- 4: Having a large group may lead to a lack of seriousness. Sometimes using a system which you are unused to can lead one to concentrate on the system not the archaeology/site.
- 5: Positive - good to see the reconstructions. Negative - tendency to just look at the mobile and not focus/engage with the archaeology itself.
- 7: Allowed freedom of movement whilst studying complex ... [comment unfinished]
- 8: Sometimes devices can be a bit idiosyncratic.
- 9: The ability to be in a particular position but get a variety of views/different visual perspective was a very useful opportunity. The whole thing also got everyone talking in a way I hadn't experienced on field trips to Fountains before.
- 10: I had difficulty in correlating where I was (positioning) with the wording.

13 Which functions of the device did you use most?

- 1: The tour guide, the reconstructions and the blog recording.
- 2: Maps and videos.
- 3: The map/GPS function to locate sites of interest.
- 4: The map. GPS.
- 5: Reconstruction diagrams and videos.
- 6: Map.
- 7: GPS, video camera.
- 9: The back button.
- 10: The back button as we kept losing our place.

14 What did you think about the look and visual design of the course?

- 1: It was quite clearly set out and on the mobile the text was clear.
- 2: The idea is very good. With bigger devices it should be a much better view.
- 3: The interface was functional but not particularly aesthetically pleasing.
- 5: Good. Clear and easy to follow.
- 6: Good!
- 7: Well put together.
- 8: I think it was a prototype but nice and simple.
- 9: Generally very clear and helpful. The screen was not particularly effective in sunlight and this made it more difficult to find the right xx, but we managed.
- 10: Look and visual design was good.

15 The course used location-based technologies to provide relevant learning materials to your phone. How did you find this?

- 1: When it worked it was very relevant and I thought it was a good idea to look at specific locations.
- 2: Although the GPS was not working at some points, it is very useful when it comes out with the explanation at a specific point.
- 3: The material was relevant to the site. Different levels of info could be provided to different audiences.
- 4: Concentrating on the device can lead one to forget about the site/archaeology.
- 5: The course material was relevant (although brief) for each location.
- 7: I liked the way the information was relevant to the specific location.
- 8: Worked well.
- 9: Generally worked well. But was a little slow responding. Interesting when new material appears as you entered a zone and this helped to focus my view on this area.
- 10: The GPS signal was not always secure.

16 Did you encounter any technical problems? If so, what problems did you have?

- 1: The course material was relevant at each location. Unfortunately now and again it lost us and it took a while to get relocated on the phone.
- 2: The GPS located us outside the zone several times when we were not, and we were unable to set the position manually.
- 3: Yes. Getting out of videos was hard.
- 4: A few but I expect these could be ironed out. Screens too small. GPS bit dodgy. The zones aren't continuous. Pictures didn't load.
- 5: Yes, a couple of times we ended up in the programming pages which affected us viewing the info for Zone 4. (Pressing wrong buttons!) It was also difficult to get out of the videos.
- 6: Low battery. Problems with pictures - small pics did not load.
- 7: No, worked well.
- 8: Sometimes devices can be a bit idiosyncratic.
- 9: Slowness of the instrument responding.
- 10: We kept losing our place.

17 What did you like most about the mobile learning course?

- 1: The reconstructions.
- 2: The possibility of seeing the reconstruction in place and the interaction with technology.
- 3: Road testing new technology and the GPS automatically providing information about the area.
- 4: Having information at your fingertips is good.
- 5: Being able to test a new technology. Although brief it has increased my knowledge of Fountains Abbey.
- 7: Novelty.
- 8: Content aware stuff.
- 9: The ability to access a variety of images related to visit location.
- 10: The graphics and showing what the abbey used to look like.

18 What did you like least about the mobile learning course?

- 1: Getting lost on the phone!
- 2: Technology went wrong several times.
- 3: Focus too much on interface. Should be audio alert for new information.
- 5: Hard to view the screen. Focus on technology stopped me from looking around so much. Too guided?
- 7: N/A
- 8: —
- 9: The difficulty of seeing the screen in bright sun/day light.
- 10: The GPS signal was not always secure.

19 Do you have any suggestions for how we could improve the mobile learning course?

- 1: Would it be useful to possibly include a listening tour as well as a visual tour. The text maybe re-iterated, therefore reading the tour guide would be a choice.
- 2: Expanding the zones and permitting a wide immersion in the site as a whole. Some oral comments and devices with bigger screens would be probably a good idea.
- 3: Clearer direction for the video blogging/recording content.
- 4: I was expecting the interactive 3-D models to be on the phone but only static photos were.
- 5: Increased screen size. Use of audio. Alarm to alert user when in an information zone.
- 7: Allow more interaction with 3D models/data set.
- 8: Maybe some more activities but great prototype.
- 9: Improve hardware speed/screen visibility. How do we follow this up? Knowing there is somewhere we could access content later and see material provided today (video blog/photos etc.) so that we could continue to use the mobile learning experience back at the university.
- 10: Give all the students cameras to photograph a zone and download them to enhance the overall image and experience of the abbey.

Conclusions

10 users trialed the software and each completed a paper-based questionnaire afterwards.

The user group

Of the 10 users who were involved in the trials, 70% were males. 7 were masters students (6 in Landscape Archaeology) and 3 were members of teaching or support staff. Their age range is broad, from 21 to over 40. 40% are aged 21-25 and 60% are over 26. They all owned their own mobile phone, 3 said that their mobile had GPS (so it is fair to assume that this third were accustomed to using it), and all rated themselves as experienced mobile phone users (20% rated themselves as very experienced).

The questionnaire results

Summary of the results from the quantitative questions

| Q5 How would you rate the tour's usefulness in learning the subject? | Extremely useful % | Useful % | Uncertain % | Not useful % | Extremely un-useful % | Average score % |
|--|-----------------------|-------------|----------------|-----------------|--------------------------|--------------------|
| | 20 | 60 | 20 | 0 | 0 | 2.00 |
| | 80% positive | | 20% | 0% negative | | |
| | Strongly agree % | Agree % | Uncertain % | Disagree % | Strongly disagree % | Average score |
| Q6 It was easy to use the equipment | 0 | 80 | 20 | 0 | 0 | 2.20 |
| | 80% positive | | 20% | 0% negative | | |
| Q7 It was easy to navigate through content | 0 | 70 | 20 | 10 | 0 | 2.40 |
| | 70% positive | | 20% | 10% negative | | |
| Q8 The mobile learning experience was fun | 40 | 40 | 20 | 0 | 0 | 1.80 |
| | 80% positive | | 20% | 0% negative | | |
| Q9 I would take another mobile learning course if it was relevant to my learning needs | 50 | 40 | 10 | 0 | 0 | 1.60 |
| | 90% positive | | 10% | 0% negative | | |
| Q10 I would recommend mobile learning as a method of study to others | 20 | 70 | 10 | 0 | 0 | 1.90 |
| | 90% positive | | 10% | 0% negative | | |
| Q11 The mobile device enhanced the learning experience | 30 | 30 | 40 | 0 | 0 | 2.10 |
| | 60% positive | | 40% | 0% negative | | |

The mean average score is obtained by allocating a score for each answer: 1 for 'extremely useful', 2 for 'useful', 3 for 'uncertain' and so on. The lower the average score, the more positive the rating is.

The results from each question are grouped below according to the different aspects that have been explored: the learning experience, the use of location-based technologies, the features of the course and its content, usability and design and suggestions for improvements.

The learning experience

Q4 What did you think of the mobile learning course you have just experienced?

The comments made by all the users are all extremely positive. Comments were that it was “more fun” than expected, “I enjoyed it”, “interesting”, 2 said it was “very interesting, it was a “good idea”, “good!”, a “fantastic experience”, and “very stimulating – lots of good ideas”. One negative comment was made, “the package today was slow”, but this user found the course “very interesting” and liked the potential for having such content available on site.

Other comments expressed were:

- “easy to understand. The information was clearly presented and informative about the site.”
- “The technology worked well and the equipment was easy to use and instructions easy to follow.”
- “Great seeing the reconstructions in situ.”
- Two could see the “potential” and possibilities for developing it further.
- Another suggested a couple of improvements: “It should be enhanced by a wider walk around the place. Probably with oral comments as well.”

Q5 How would you rate its usefulness in learning the subject?

No negative ratings were given concerning the usefulness of the tour in learning the subject. 80% thought it was ‘useful’ and 20% were ‘uncertain’. The average score was 2.00. Two comments made were: “Although brief it has increased my knowledge of Fountains Abbey.”; “I learnt facts I did not previously know about the site”,

Q11 The mobile device enhanced the learning experience.

60% thought that the mobile device enhanced the learning experience: 30% ‘strongly agree’, 30% ‘agree’ and 40% are ‘uncertain’. The comments made in the responses to Q12 (see below) illustrate how they felt that the learning experienced has or not been enhanced by the use of the mobile device. The average score was 2.10

Q12 In what ways did it (or did not) enhance the learning experience?

Comments can be divided into the positive and negative: 8 comments were positive and 7 were negative.

Positive comments:

- Three mentioned that they liked the “reconstructions” of the abbey: they “brought the abbey to life which was very useful”; “It permits a broader audience to figure out the former view of the place.”.

- “Also, filming the blogs made us think about what we were looking at in more detail.”
- “I learnt facts I did not previously know about the site”
- “Allowed freedom of movement whilst studying complex ...” [comment unfinished]
- “The ability to be in a particular position but get a variety of views/different visual perspective was a very useful opportunity.”
- “The whole thing also got everyone talking in a way I hadn't experienced on field trips to Fountains before.”

Negative comments:

- Three commented that the mobile devices were a distraction from engaging with the archaeology/site itself: I “felt constantly looking at the interface distracted from observing the feature itself”; “Sometimes using a system which you are unused to can lead one to concentrate on the system not the archaeology/site.”; there was a “tendency to just look at the mobile and not focus/engage with the archaeology itself”.
- Two comments were about problems experienced in using the technology: “Sometimes devices can be a bit idiosyncratic”; “I had difficulty in correlating where I was (positioning) with the wording”.
- Other comments were:
 - “the archaeological and historical explanation is very short”
 - “Having a large group may lead to a lack of seriousness.”

Q8 The mobile learning experience was fun

80% agreed that the mobile learning experience was fun, with 40% answering ‘strongly agree’ and 40% answering ‘agree’. 2 (20%) were ‘uncertain’. The average score was 1.80.

Q9 I would take another mobile learning course if it was relevant to my learning needs.

A good indication that the students had a positive experience and felt that they learned from the tour is that 90% agreed that they would take another mobile learning course: 50% answered ‘strongly agree’, 40% ‘agree’ and 1 (10%) was ‘uncertain’. The average score was 1.60.

Q10 I would recommend mobile learning as a method of study to others.

All of the users except 1 (90%) would recommend mobile learning as a method of study to others (they rated ‘uncertain’, and it was the same user that answered ‘uncertain’ to Q9). Of the rest, 20% ‘strongly agreed’ and 70% ‘agreed’. The average score was 1.90.

The use of location-based technologies

Q15 The course used location-based technologies to provide relevant learning materials to your phone. How did you find this?

7 users (70%) commented that the learning materials provided to the phone were relevant and that it worked well (most of the time). Specific comments made were:

- “When it worked it was very relevant and I thought it was a good idea to look at specific locations.”
- “it is very useful when it comes out with the explanation at a specific point”
- “I liked the way the information was relevant to the specific location.”
- “Interesting when new material appears as you entered a zone and this helped to focus my view on this area.”

4 users reported problems with the GPS:

- “when it worked it was very relevant”
- “the GPS was not working at some points”
- “was a little slow responding”
- “The GPS signal was not always secure.”, resulting in the following problem: “I had difficulty in correlating where I was (positioning) with the wording.”

One repeated a negative comment made in an earlier question: “Concentrating on the device can lead one to forget about the site/archaeology.”.

One made a suggestion for improvement: “Different levels of info could be provided to different audiences.”.

Q16 Did you encounter any technical problems? If so, what problems did you have?

All users responded to this question, although one said they didn’t have any problems and another said they encountered “a few but I expect these could be ironed out”.

Of the 9 users that reported problems, a range of technical problems were experienced (note that several users have reported more than one problem):

- 3 reported problems with the GPS signal and the effects this had:
 - “Unfortunately now and again it lost us and it took a while to get relocated on the phone.”
 - “The GPS located us outside the zone several times when we were not, and we were unable to set the position manually.”
 - “GPS bit dodgy.”
- 2 reported problems in exiting from videos: “getting out of videos was hard”.
- 2 reported problems with pictures not loading.
- Other problems reported were:
 - “Screens too small.”
 - “The zones aren’t continuous.”
 - “a couple of times we ended up in the programming pages which affected us viewing the info for Zone 4. (Pressing wrong buttons!)”
 - “Low battery.”
 - “Sometimes devices can be a bit idiosyncratic.”
 - “Slowness of the instrument responding.”
 - “We kept losing our place.”

Despite some of the technical difficulties experienced due to the lack of robustness of the GPS, and the shortcomings of the software reported, some users commented that they could see the “potential” of the technologies for this type of learning experience. Two users said:

- “The course was very interesting and clearly has potential for development.”
- “Very interesting. The package today was slow but the potential of carrying such content onto site to have great possibilities.”

Features of the course and its content

Q13 Which functions of the device did you use most?

The functions used most were (note that most cited more than one function):

- Maps – 4 users
- GPS – 3 users
- The reconstructions of the abbey – 2 users
- Videos – 2 users
- The back button – 2 users
- The tour guide – 1 user
- Blog recording – 1 user
- Video camera – 1 user.

Q17 What did you like most about the mobile learning course?

9 of the users responded to this question – note that some made comments about more than one aspect they liked about the course.

The comments from 4 users related to the visual elements provided within the course, with 2 referring specifically to the reconstructions of the abbey:

- “the reconstructions”
- “the possibility of seeing the reconstruction in place”
- “The ability to access a variety of images related to visit location.”
- “The graphics and showing what the abbey used to look like.”

4 users liked the use of new technologies, and of these, 2 comments relate to being able to test out new technology, and another liked the “novelty” of it:

- “Road testing new technology”
- “Being able to test a new technology.”
- “the interaction with technology”
- “Novelty.”

2 users made comments about the context-sensitive aspect of the course:

- “the GPS automatically providing information about the area”
- “Content aware stuff.”

Other comments made were:

- “Having information at your fingertips is good.”
- “Although brief it has increased my knowledge of Fountains Abbey.”

Q18 What did you like least about the mobile learning course?

Only 6 users responded to this question and said what they liked least (note that some commented on more than one aspect of the course).

2 users had problems viewing the screen:

- “Hard to view the screen.”
- “The difficulty of seeing the screen in bright sun/day light.”

2 thought that there was too much emphasis on looking at the technology or on the interface:

- “Focus too much on interface. Should be audio alert for new information.”
- “Focus on technology stopped me from looking around so much.”

Other comments were:

- “Getting lost on the phone!”
- “Too guided?”
- “Technology went wrong several times.”
- “The GPS signal was not always secure.”

Usability and design

Q6 It was easy to use the equipment.

The majority, 80%, said it was easy to use the equipment: 80% answered ‘agree’ and 20% answered ‘uncertain’. The average score was 2.20.

Q7 It was easy to navigate through content.

The majority also found it easy to navigate through the content: 70% rated ‘agree’, 2 (20%) rated ‘uncertain’. 1 (10%) rated ‘disagree’. The average score was 2.40.

Q14 What did you think about the look and visual design of the course?

All the users made positive comments about the look and visual design of the course, although one thought it was “functional but not particularly aesthetically pleasing” and another reported problems in seeing what was on the screen in sunlight. Comments related to the design being “good”, “clear”, “easy to follow”, “well put together”, “nice and simple”.

Suggestions for improvement

Q19 Do you have any suggestions for how we could improve the mobile learning course?

A number of interesting suggestions for how the course could be improved were made and suggestions have also been made within the answers to other questions and are presented here as well (note that some made more than one suggestion):

- 3 users made suggestions for also including audio/oral comments, with one saying that two ways of accessing the tour would provide a choice for the user: “Would it

- be useful to possibly include a listening tour as well as a visual tour. The text maybe re-iterated, therefore reading the tour guide would be a choice.”.
- 2 users suggested that you need some kind of audio notification when new information is pushed to the phone or when you enter a new zone:
 - “Alarm to alert user when in an information zone.”
 - “Should be audio alert for new information.”
 - 3 users suggested improvements to the screens of the devices, 2 would like larger screens and 1 would like the screen visibility improved.
 - 4 users suggested enhancements to the content of the course:
 - “Allow more interaction with 3D models/data set.”
 - “Maybe some more activities but great prototype.”
 - “Different levels of info could be provided to different audiences.”
 - One suggested that whilst the course material was relevant, it was “brief” for each location.
 - Other suggestions were:
 - “Expanding the zones and permitting a wide immersion in the site as a whole.”
 - “Clearer direction for the video blogging/recording content.”
 - “I was expecting the interactive 3-D models to be on the phone but only static photos were.”
 - “Improve hardware speed”
 - “Give all the students cameras to photograph a zone and download them to enhance the overall image and experience of the abbey.”

Main conclusions

All the users made extremely positive comments about **what they thought of the mobile learning course**, describing it as “more fun” than expected, “I enjoyed it”, “interesting”, 2 said it was “very interesting, it was a “good idea”, “good!”, a “fantastic experience”, and “very stimulating – lots of good ideas”. 80% rated it as being useful for learning the subject. 60% thought **the mobile device enhanced the learning experience**, whilst 40% were uncertain, and the comments made illustrate their views. On the positive side three liked the reconstructions of the abbey as they “brought the abbey to life” and shows what it would have looked like. Others thought that “filming the blogs made us think about what we were looking at in more detail”, that “I learnt facts I did not previously know about the site”, and one noted that it “got everyone talking in a way I hadn't experienced on field trips to Fountains before”. On the negative side, three found that having to look at the mobile devices was a distraction from engaging with the archaeology/site itself, and one would like more archaeological and historical explanation. However, 80% agreed that the mobile learning experience was fun, and 9 out of the 10 users (90%) would take another mobile learning course if it was relevant to their learning needs and would recommend mobile learning as a method of study to others, which is a good indication that most of them had a positive experience (the other user answered ‘uncertain’ to both of these questions).

On the use of the location-based technologies, 7 users (70%) commented that the learning materials provided to the phone were relevant and that it worked well (most of the time): “I liked the way the information was relevant to the specific location”. One said that

when new material appears on the phone when you enter a new zone, it helps to focus your attention on that, which was a comment that was also made by users in the evaluation of WP4: “Interesting when new material appears as you entered a zone and this helped to focus my view on this area.” However, another user said, “Concentrating on the device can lead one to forget about the site/archaeology.”.

9 users reported **problems with the technologies used**, and in particular the robustness of the GPS signal, which at times did not work, was slow to respond or located them outside a zone. Such problems resulted in them spending time to get relocated, or in some instances they lost their place. 2 reported problems exiting from videos, and 2 with pictures not loading. Other problems reported were “screens too small”, “low battery”, “sometimes devices can be a bit idiosyncratic”, “slowness of the instrument responding”. Despite some of the technical difficulties experienced, some users commented that they could see the “potential” of the technologies for this type of learning experience, for example: “Very interesting. The package today was slow but the potential of carrying such content onto site to have great possibilities.”

Responses about **the features of the course and its content** were also very positive. In response to the question ‘**what did you like most about the mobile learning course**’, 4 comments related to the use of the visual elements provided: the “reconstructions”; “The graphics and showing what the abbey used to look like.”; “The ability to access a variety of images related to visit location.”. 4 users liked the use of new technologies, and of these, 2 comments relate to being able to test out new technology, and another liked the “novelty” of it. 2 users liked the context-sensitive aspect of the course: “the GPS automatically providing information about the area”; “Content aware stuff.”. Other comments made were: “Having information at your fingertips is good.”; “Although brief it has increased my knowledge of Fountains Abbey.”

Only 6 users responded to the question ‘**what did you like least about the mobile learning course**’. 2 found it difficult to see the screen in bright sunlight, and 2 thought that there was too much emphasis on having to look at the technology or the device interface, summed up by one as: “Focus on technology stopped me from looking around so much.”, with the other saying “Should be audio alert for new information.”. 3 comments related to problems experienced with the technology, and another thought it was “Too guided?”.

The **usability and design** of the course was also well received. The majority (80%) found the equipment easy to use and navigate through the content (70%). Some comments were made that larger screens would be useful, and some reported difficulties in being able to see the content on the screen in bright sunlight. The design was found to be “clear”, “easy to follow” and “nice and simple”.

A range of useful **suggestions for improvement** were made, including using audio to indicate when new content is pushed to the phone or to provide choice for users. Some would like more content and activities, and some would like large and better visibility on the mobile screens.

The mobile tour has been very well received by the users, and they are able to see the benefits that the mobile technologies have brought to the experience.

Appendix 1: The student questionnaire

Version 2: 7/11/08

CONTSENS Mobile Learning Evaluation Questionnaire

Please complete this questionnaire. Your views are very important to us, so please do give your honest opinion. All your answers are confidential, and you will not be identified in any resulting work.

Name: Male: Female:

Course or module:

Age: 18-20 21-25 26-30 31-35 36-45 Over 40

1. Which mobile phone do you own?

2. Does your mobile have GPS (Global Positioning System)? Yes No Don't know

3. How would you rate your experience in using mobile phones?

Very experienced Experienced Not experienced

4. What did you think of the mobile learning course you have just experienced?

5. How would you rate its usefulness in learning the subject?

Extremely useful Useful Uncertain Not useful Extremely un-useful

6. It was easy to use the equipment.

Strongly agree Agree Uncertain Disagree Strongly disagree

7. It was easy to navigate through the content.

Strongly agree Agree Uncertain Disagree Strongly disagree

8. The mobile learning experience was fun.

Strongly agree Agree Uncertain Disagree Strongly disagree

9. I would take another mobile learning course if it was relevant to my learning needs.

Strongly agree Agree Uncertain Disagree Strongly disagree

10. I would recommend mobile learning as a method of study to others.

Strongly agree Agree Uncertain Disagree Strongly disagree

11. Using the mobile device enhanced the learning experience.

Strongly agree Agree Uncertain Disagree Strongly disagree

12. In what ways did it (or did not) enhance the learning experience?

13. Which functions of the device did you use most?

14. What did you think about the look and visual design of the course?

15. The course used location-based technologies to provide relevant learning material to your phone. How did you find this (e.g. was the course material always relevant, did this work well, etc.)?

16. Did you encounter any technical problems, e.g. in using the device and/or location-based technologies? If so, what problems did you have?

17. What did you like most about the mobile learning course?

18. What did you like least about the mobile learning course?

19. Do you have any suggestions for how we could improve the mobile learning course?

If you would be interested in being involved in further research with us into using mobile phones for learning, please give your details below:

Name:

Email address:

Thank you for your help

Appendix 2: The questionnaire responses in tabular format

Questions 1-13

| ID | Gender | Course/module | Age | 1 Phone | 2 GPS | 3 Phone experience | 4 What did you think of the mobile learning course you have just experienced? | 5 Usefulness in learning the subject | 6 Easy to use the equipment | 7 Easy to navigate through content | 8 The mobile learning experience was fun | 9 Would take another mobile learning course | 10 Recommends mobile learning | 11 The mobile device enhanced the learning experience | 12 In what ways did it (or did not) enhance the learning experience? | 13 Which functions of the device did you use most? |
|----|--------|--------------------------|-----|----------------------|-------|--------------------|--|--------------------------------------|-----------------------------|------------------------------------|--|---|-------------------------------|---|--|---|
| 1 | 2 | Landscape Archaeology MA | 5 | Nokia | 2 | 2 | It was much better than I thought it was going to be - and more fun! | 2 | 2 | 2 | 2 | 2 | 2 | 1 | The reconstruction videos brought the abbey to life which was very useful. Also, filming the blogs made us think about what we were looking at in more detail. | The tour guide, the reconstructions and the blog recording. |
| 2 | 1 | Landscape Archaeology MA | 2 | Samsung Z | 2 | 2 | I enjoyed it. It should be enhanced by a wider walk around the place. Probably with oral comments as well. | 2 | 2 | 2 | 2 | 2 | 2 | 3 | It is strongly useful for the reconstruction of the abbey. It permits a broader audience to figure out the former view of the place. On the other hand, the archaeological and historical explanation is very short. | Maps and videos. |
| 3 | 1 | Landscape Archaeology MA | 2 | Sony Ericsson K800i | 2 | 2 | The course was interesting and easy to understand. The information was clearly presented and informative about the site. | 2 | 2 | 4 | 1 | 1 | 2 | 3 | I learnt facts I did not previously know about the site but felt constantly looking at the interface distracted from observing the feature itself. | The map/GPS function to locate sites of interest. |
| 4 | 1 | Landscape Archaeology MA | 3 | Nokia rubberised one | 3 | 2 | Good idea. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | Having a large group may lead to a lack of seriousness. Sometimes using a system which you are unused to can lead one to concentrate on the system not the archaeology/site. | The map. GPS. |
| 5 | 1 | Landscape Archaeology MA | 3 | Nokia | 2 | 2 | The course was very interesting and clearly has potential for development. The technology worked well and the equipment was easy to use and instructions easy to follow. | 2 | 2 | 2 | 2 | 1 | 2 | 3 | Positive - good to see the reconstructions. Negative - tendency to just look at the mobile and not focus/engage with the archaeology itself. | Reconstruction diagrams and videos. |
| 6 | 2 | ERASMUS (BA) student | 2 | Nokia N95 | 1 | 1 | Good! | 1 | 2 | 3 | 1 | 2 | 1 | 2 | | Map. |
| 7 | 1 | Landscape Archaeology MA | 2 | Nokia N95 | 1 | 2 | Fantastic experience. Great seeing the reconstructions in situ. | 1 | 2 | 2 | 1 | 1 | 1 | 1 | Allowed freedom of movement whilst studying complex ... [comment unfinished] | GPS, video camera. |

| | | | | | | | | | | | | | | | | |
|----|---|---|---|-----------------------|---|---|--|---|---|---|---|---|---|---|---|--|
| 8 | 1 | University of Sheffield Learning Technologies | 5 | Nokia E66 | 1 | 1 | Very stimulating - lots of good ideas. | 2 | 2 | 2 | 3 | 1 | 2 | 2 | Sometimes devices can be a bit idiosyncratic. | |
| 9 | 1 | Staff | 6 | Sony Ericsson | 2 | 2 | Very interesting. The package today was slow but the potential of carrying such content onto site to have great possibilities. | 2 | 3 | 2 | 2 | 1 | 2 | 2 | The ability to be in a particular position but get a variety of views/different visual perspective was a very useful opportunity. The whole thing also got everyone talking in a way I hadn't experienced on field trips to Fountains before. | The back button. |
| 10 | 2 | | 6 | Sony Ericsson RIEA031 | 2 | 2 | | 3 | 2 | 2 | 1 | 2 | 2 | 1 | I had difficulty in correlating where I was (positioning) with the wording. | The back button as we kept losing our place. |

Questions 14 onwards

| ID | 14 Look and visual design | 15 How did you find the location-based technologies? | 16 Technical problems | 17 What did you like most? | 18 What did you like least? | 19 Do you have any suggestions for how we could improve the mobile learning course? | Formal/informal educational context and previous knowledge of users | Individual training needs | Expected outcomes |
|----|---|--|--|---|---|---|---|---|---|
| 1 | It was quite clearly set out and on the mobile the text was clear. | When it worked it was very relevant and I thought it was a good idea to look at specific locations. | The course material was relevant at each location. Unfortunately now and again it lost us and it took a while to get relocated on the phone. | The reconstructions. | Getting lost on the phone! | Would it be useful to possibly include a listening tour as well as a visual tour. The text maybe re-iterated, therefore reading the tour guide would be a choice. | Degree BSc in Human and Natural Environments. At present I am on a MA in Landscape Arch course. | I was asked to attend this training day by my course director. | I expected not to enjoy it or be able to do it as I am not very technologically minded - however it turned out fine and I enjoyed it afterall! Good work I say! |
| 2 | The idea is very good. With bigger devices it should be a much better view. | Although the GPS was not working at some points, it is very useful when it comes out with the explanation at a specific point. | The GPS located us outside the zone several times when we were not, and we were unable to set the position manually. | The possibility of seeing the reconstruction in place and the interaction with technology. | Technology went wrong several times. | Expanding the zones and permitting a wide immersion in the site as a whole. Some oral comments and devices with bigger screens would be probably a good idea. | History degree/MA Landscape Archaeology. | Getting involved in a learning experience with the possibility of analysing a past site with modern technology. | I expected to use some GPS and learning videos, but it was a much broader experience. Good work I say |
| 3 | The interface was functional but not particularly aesthetically pleasing. | The material was relevant to the site. Different levels of info could be provided to different audiences. | Yes. Getting out of videos was hard. | Road testing new technology and the GPS automatically providing information about the area. | Focus too much on interface. Should be audio alert for new information. | Clearer direction for the video blogging/recording content. | BA History/Archaeology/MA Landscape Archaeology. | Information within archaeological context. | Helping create a new/interesting way to learn. Harnessing new technologies for heritage management. |
| 4 | | Concentrating on the device can lead one to forget about the site/archaeology. | A few but I expect these could be ironed out. Screens too small. GPS bit dodgy. The zones aren't continuous. Pictures didn't load. | Having information at your fingertips is good. | | I was expecting the interactive 3-D models to be on the phone but only static photos were. | Master's student | Learning about a site | Using new technology/software. Not much prior info give I'm afraid. |

| | | | | | | | | | |
|----|--|---|--|---|--|---|---|--|---|
| 5 | Good. Clear and easy to follow. | The course material was relevant (although brief) for each location. | Yes, a couple of times we ended up in the programming pages which affected us viewing the info for Zone 4. (Pressing wrong buttons!) It was also difficult to get out of the videos. | Being able to test a new technology. Although brief it has increased my knowledge of Fountains Abbey. | Hard to view the screen. Focus on technology stopped me from looking around so much. Too guided? | Increased screen size. Use of audio. Alarm to alert user when in an information zone. | BA (Hons) Ancient and Medieval History. 7 years working full time (mainly university administration). | Current - MA Landscape Archaeology (part-time) | Was unsure what today entailed but was interested to experience the use of a new technology for use in archaeology. |
| 6 | Good! | | Low battery. Problems with pictures - small pics did not load. | | | | Computer support in archaeology. | Yes | I learn a job. |
| 7 | Well put together. | I liked the way the information was relevant to the specific location. | No, worked well. | Novelty. | N/A | Allow more interaction with 3D models/data set. | | | |
| 8 | I think it was a prototype but nice and simple. | Worked well. | Sometimes devices can be a bit idiosyncratic. | Content aware stuff. | - | Maybe some more activities but great prototype. | PhD Archaeology but not in this particular field so not a subject expert by any means. | Motivation - coming at this more out of interest in the technology really. | Was generally keen to see the technology in action. |
| 9 | Generally very clear and helpful. The screen was not particularly effective in sunlight and this made it more difficult to find the right functions, but we managed. | Generally worked well. But was a little slow responding. Interesting when new material appears as you entered a zone and this helped to focus my view on this area. | Slowness of the instrument responding. | The ability to access a variety of images related to visit location. | The difficulty of seeing the screen in bright sun/day light. | Improve hardware speed/screen visibility. How do we follow this up? Knowing there is somewhere we could access content later and see material provided today (video blog/photos etc.) so that we could continue to use the mobile learning experience back at the university. | Member of staff and 3 years an archaeologist with a research interest in medieval monasteries (not Cistercian though) and I bring a field trip to Fountains once or twice a year with students. | As an archaeologist I typically work on architecture and related art history - so the idea of a multifaceted package which could allow a user to run "randomly" between subjects interests me ... intelligent learning packages which respond to people with needs within a particular subject area but then allow them to push these boundaries and develop their activity beyond this really ensures the technology provides opportunities way beyond the usual paper-based handout. | Medieval monasteries, the English landscape, learning something new (rather than conveying what I know to others). Rain. I expected the material to be more text-based, i.e. an electronic handout. However it was not like that at all and looks much more useful. |
| 10 | Look and visual design was good. | The GPS signal was not always secure. | We kept losing our place. | The graphics and showing what the abbey used to look like. | The GPS signal was not always secure. | Give all the students cameras to photograph a zone and download them to enhance the overall image and experience of the abbey. | I am studying for an MA in European Prehistory. I was interested in the use of this technology to enhance the viewing of cave art. | | I worked as a tour guide a Crewell Crags Heritage Centre and there may be a case for using more technical support there. |