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Using M-learning as a Means to Promote Self-direction and Engagement in Apprenticeship Theoretical Lessons

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Abstract

An exploratory case study was carried out to investigate if the use of mobile phones as a tool for learning could address concerns over the current learning of the carpentry and joinery apprentices in the Dublin Institute of Technology. The concerns are regarding a lack of learner self-direction and engagement with the learning content. A high level of mobile phone usage was apparent among the apprentice cohort. It was decided to take advantage of the potential learning opportunity offered by mobile technologies to promote the learning and engagement of the apprentices. Towards this goal, a compatible resource was developed, hosting presentations, course content, videos and questions. This study explored the views of the learners in the carpentry and joinery trade apprenticeship and their attitudes towards developing an m-learning resource. The aim of the research was to explore if this m-learning resource encouraged self-direction and engagement. Further objectives of this study were to establish a start point for further research projects and resource development.

Keywords: Apprentice learner, Engagement, M-learning, Resource, Self-directed

1

Introduction

There is a great potential, with a correctly managed resource and strategy, in using m-learning to promote and enhance the learning for the apprentice. An exploratory case study was carried out to investigate if using mobile phones could promote self-direction and engagement. Towards this goal, a compatible resource was developed, hosting presentations, course content, videos and questions. This study discusses the views of the learners in the carpentry and joinery trade apprenticeship and their attitudes towards developing an m-learning resource. The term m-learning in this context is primarily suggestive of learning using mobile phones to facilitate, support, enhance and extend the reach of teaching and learning.

Background and Context

> The "why" of self-directed learning is survival - your own survival as an individual, and also the survival of the human race. Clearly, we are not talking here about something that would be nice or desirable…We are talking about a basic human competence - the ability to learn on one's own - that has suddenly become a prerequisite for living in this new world (Knowles, 1975, pp.16-17).

Apprenticeship is the recognised means by which people are trained to become craftspeople in Ireland. The main craft trades have been designated by FÁS (Foras Áiseanna Soathair) and come within the scope of the Statutory Apprenticeship system, which is organised in Ireland by FÁS in co-operation with the Department of Education and Science, employers and unions (FÁS, 2012). The apprenticeship system in Ireland is a "standard-based" model whereby apprentices must undertake structured training in the skills and knowledge of their chosen trade, and undergo specific tests and assessments to ensure that pre-set standards of ability and competences are attained. As shown in Figure 1 the carpentry and joinery apprenticeship is a modular standards-based system comprising of 3 on-the-job and 4 off-the-job alternate phases of training
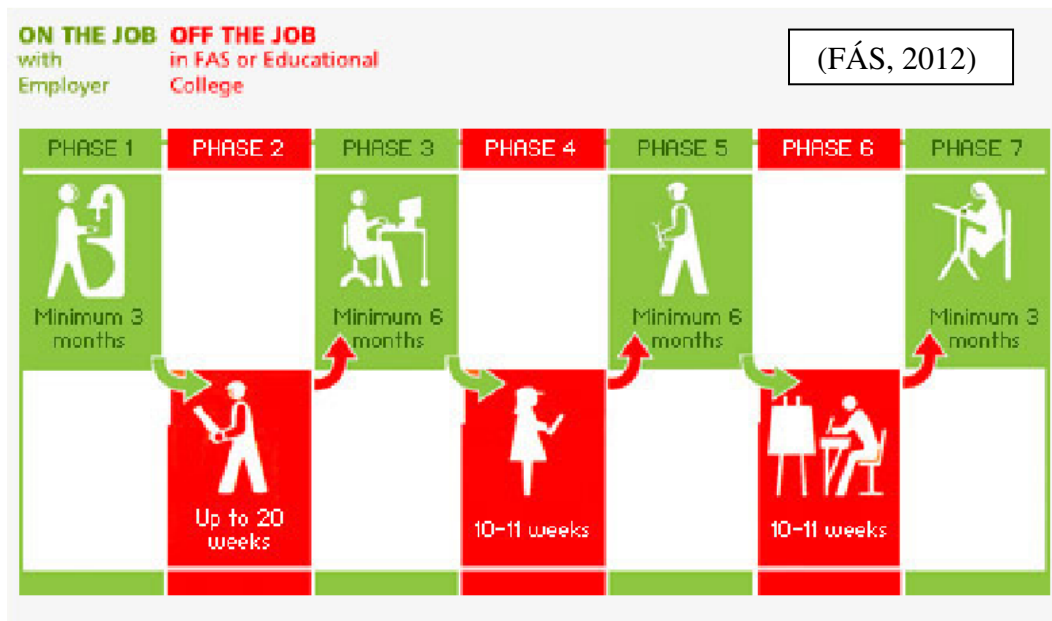
2

and development.

(FÁS, 2012)

Figure 1   Apprenticeship modular standards-based system

The off-the-job phases are delivered by a FÁS Training Centre at phase 2, and an Institute of Technology or another approved training provider, at phase 4 and 6. The key factor in delivery of an off-the-job training phase is that it is delivered in a single training environment to ensure the integration of practical training with the necessary theoretical and personal skills (FÁS, 2012). The apprenticeship cycle is deemed to be complete when an apprentice has served the minimum timeframe of four years from the date of registration and has successfully completed all of the alternating on-the-job and off-the-job phases of their apprenticeship.

The Dublin Institute of Technology (DIT) is one many providers for the 'off-the-job' phases in the apprenticeship. The apprentice participants in this study are in attendance at the Institution for 10 weeks at phase 4 level. Within this block release from their employer, the carpentry apprentice must achieve a minimum pass grade in all

3

assessments that are provided by FÁS. There are 6 summative assessments, with 3 carried out in week 6 and 3 at the end of week 10 consisting of 2 theoretical, 2 practical and 2 technical drawing assessments. The focus in this study is on the first theory elements.

There is an emphasis on specific information in theoretical classes and how it can be asked in an assessment. There is a concentration on cognitive learning outcomes. The learner's goal is the memorisation of information most likely to appear on the exam. Learners expect lecturers to teach them what's required to pass the test. The lessons taught are paced and designed for an average student. The information is organised and presented by the lecturer.

The lecturers feel that the current theory assessment does not promote an understanding of the overall learning elements of the trade. The students lack key skills in applying theoretical knowledge to differing situations, with course material being viewed simply as a collection of abstract concepts (Kember, Ho, & Hong, 2008). The current exam questions require specific responses to achieve a grade. The energies of the apprentice tend to focus on how to answer questions as opposed to the understanding of the principles and their application. The summative assessment promotes surface learning, as described by Reece & Walker (2003).

The students are largely passive in the theory lessons and despite various pedagogical approaches from lecturers, didactic approaches prevail that are organised and structured toward assessment (O'Donnell & Delaney, 2011). Traits of 'self-directed learning' appear little in evidence. Previous studies in the institute have explored pedagogy,

4

feedback and assessment initiatives (O'Donnell & Delaney, 2011). Within the context of this study, it was decided to investigate the potential of m-learning to promote self-directed learning and engagement in the delivery of the Phase 4 course.

Why Self-directed Learning?

For this study, self-directed learning was viewed as a key to moving away from the lecturer centred classroom. Self-directed learning has been described as a process

> ... in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975, p.18).

Other apprentice studies, have demonstrated a low preference for independent learning, as the programmes are instructor led, well organised and the expectations of learners are made very clear (Smith, 2000). Smith later states the need for self-directed skills while in training at the workplace, which is similar in the Irish context as learners are often left on their own to complete and master tasks in Industry. There was no desire to 'drag' the learner from the current pedagogy, but to introduce new skills in learning for life.

Dewey's (1938) research of 'self-directed learning' proposed that all persons are born with an unlimited potential for growth and development. He defined education as the agency that facilitates this growth and cautioned that the teacher should be the one who guides but does not interfere with nor control the process of learning. It is argued here that, to a certain degree, the teacher should 'interfere' with the process of learning. As practitioners we research, study, experiment and engage in new teaching and learning strategies. This interference is the application of these strategies to support the improvement of the learner.

5

Project Aim and Objectives

The project aim was to promote self-directed learning and engagement by offering theory, practical content and self-assessment exercises on one resource for each student to explore. It was anticipated that an m-resource would promote the learning outside of class and away from delivered lessons and 'handed out' notes. With the overall apprentice training context in mind, within this study there are further objectives that can be addressed, such as the important characteristics of learning for the student, and the learner's perceived effectiveness of m-learning, in comparison to the current learning.

Technology

In the design cycle stage, research was carried out with a view to developing an e-learning resource. Feedback, from various students over five years teaching, and observation from taught computer aided drawing classes indicated that many of the carpentry learners were not proficient or comfortable with computers. A study of the Irish context suggests computers or ICT (information communication technology) in education has not had the impact expected (Loftus, 2009). Some of its failings have been due to government policy, access to enough reliable equipment, support structures and the teacher resistance to ICT at previous levels. From observation, the cohort was very amenable to mobile smart phones. The initial idea around e-learning eventually led to m-learning, in order to relate better to the apprentice learner, using the technology with which they are familiar and most comfortable.

6

Why m-Learning?

> Mobile and wireless technologies can provide flexible and timely access to learning resources, instantaneous communication, portability, active learning experiences and the empowerment and engagement of learners...
>
> (JISC, 2010, para. 1).

The m-learning or "mobile learning" definition has invoked discussion among many authors (Traxler, 2009) and classification beyond technology and devices. It is learning supported by mobile technology which allows for education outside of the classroom environment (Barbosa, Reinhard, Saccol, & Schlemmer, 2010), and is transferable across contexts (Park, 2011). In other words, with the use of mobile devices, learners can learn anywhere and at any time. The MoLeNET initiative across the UK defined m-learning as...

> ...the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning (MoLeNet, 2007, para. 4).

In this context m-learning is viewed as using mobile phones to facilitate, support, enhance and extend the reach of teaching and learning.

The m-Learning Resource

The mobile smart phone, with its advanced computing capability, applications and internet connectivity, offers instructional support uses such as delivery of courses, lectures, video, audio, notes, e-books, interactive content and instructor feedback. A design model for mobile phone learning presents six key principles for use by instructional designers including the need to design simple and intuitive interface, interactive multi-media, short and modular lessons engaging and entertaining activities, contextually relevant and meaningful content, and just-in-time delivery (Dillard, 2012), while being aware of the challenges to overcome such as small screen size, file sizes

7

and technology capabilities (Elias, 2011). In summary, the message is to keep it short, keep it simple, integrate rich media, use the features such as audio, video, photos and text message (short message service or SMS), and finally keep it current with relevant updates on new information.

The information on the website blended with the course material towards the week six learning requirements. Figure 2 outlines the general layout upon opening each page in the website. The m-learning website had seven pages - a homepage, five pages each based on different core theory learning units, and a final page for feedback and further links to useful websites.

Welcome: Building Regulations
This page will provide information on Building Regulations relating to this course.

[C & J mLearn]
Learning on the go!

The Syllabus; What we need to know

By the end of this unit each apprentice will be able to:

- Explain the purpose and administration procedures of the building regulations

- Identify who is responsible for building regulations

- Explain role of Government and Local Authorities

- Explain the purpose of a fire certificate

- Summarise technical guidance documents

Site menu:
Home page
Tools and Equipment
Materials
Timber Frame
Building Regs
Safety & Health Regs
And a last one

Important note
The content on this page is for learning purposes only and is being used as part
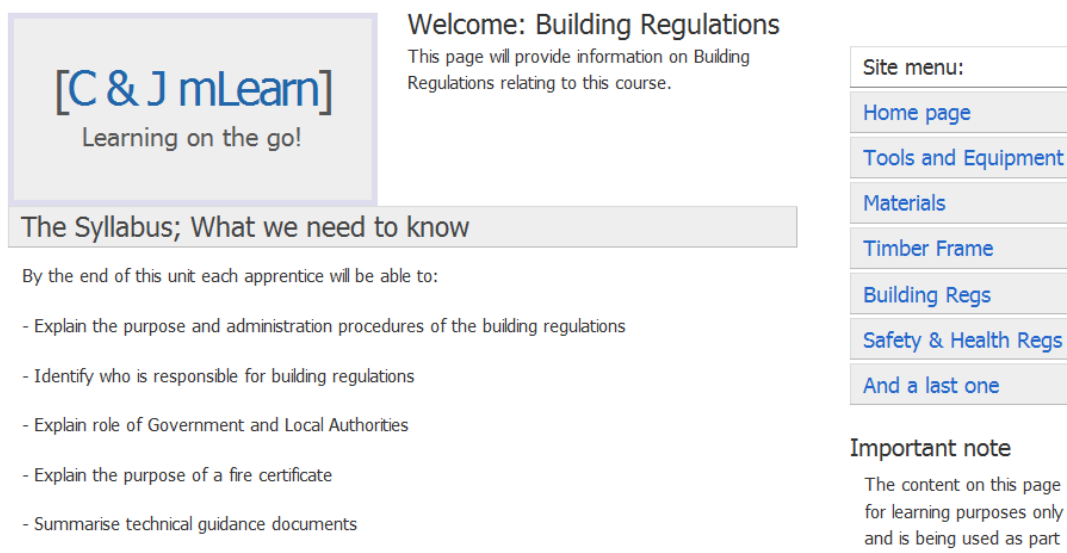
Figure 2   PC Screenshot of CJ mLearn webpage with general layout and structure

Learning outcomes were stated on the page and these were supported with PowerPoint presentations, supporting text, video and some online questions and quizzes as shown in Figure 3. Google Analytics anonymously recorded webpage access and usage.

8

Powerpoint Link

YouTube Video

Questions
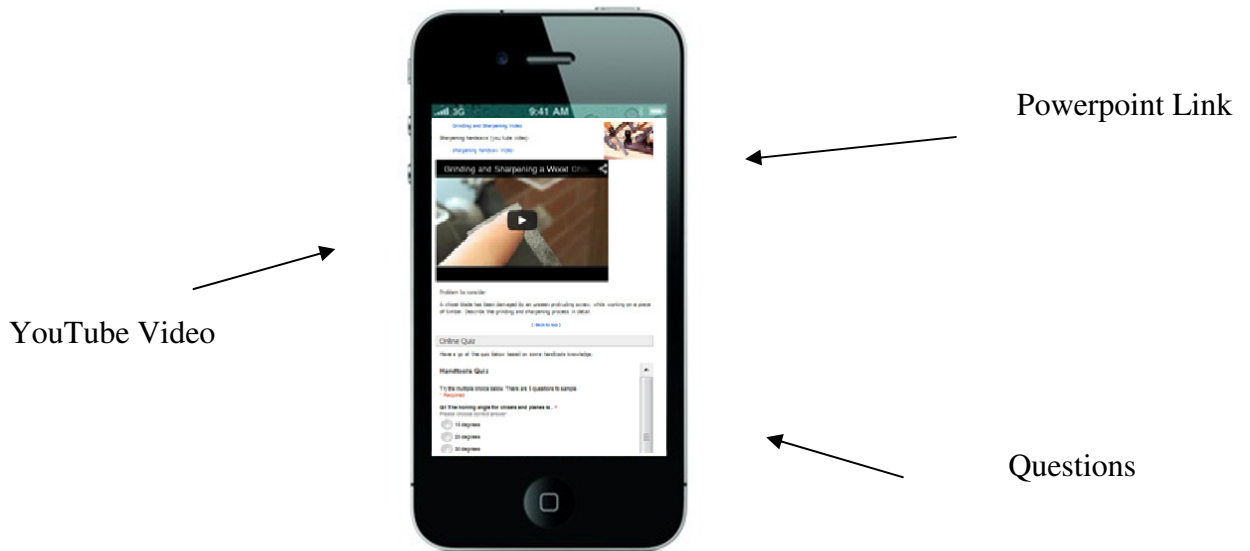
Figure 3   Screenshot from iPhone 4 mobile phone showing video content and quiz

The basic structure of each web page is constructed using html (HyperText Markup Language) and CSS (Cascading Style Sheets) code downloaded from a free website template site (Viklund, 2008). The html was adapted and rewritten to meet my own requirements. CSS code was written to develop my own colour scheme and font sizing on the Webpages. JavaScript code was incorporated to manage some of the interactive content such as the Quizzes (Figure 4) and Word searches.

Figure 4   Screenshot showing start of Quiz

9

PowerPoint presentations were visible in a frame on each page but hosted on cloud storage such as Google Drive and Microsoft Skydrive. Videos were hosted on YouTube and visible in a frame on each webpage.

Case Study

Research Methodology

An exploratory case study method was chosen to analyse the outcome of the proposed resource on the student learning. Case study methodology was chosen due to the research topic being multifaceted and the results would not be definitive. Action research was not an option due to the transitional changes in the Institute and the lack of opportunity to implement changes in a second cycle. An in depth analysis of an apprentice group of students, noting signs of self-direction and engagement, was sought on the basis of the research question.

The methodology needed to accommodate flexibility. There were many unknowns including the participants, their mobile technology and available learning content. Within the context of this study, qualitative methods were used to explore the research question. The research sought to explore the self-learning and engagement of the student. By using a diversity of methods such as surveys, discussion and focus groups, it allowed better measurement and construction of conclusions and recommendations. The underlying pedagogy was a blended approach and the developed resource was in addition to the taught lessons in class.

Within the research aims, objectives and methods, the key principles in ethics have been considered and followed within the Institute's guidelines. The participants were offered

10

a fair, non-exploitive and well considered project. The resource aims to benefit the student. Important ethical considerations have been implemented, such as informed consent, self-determination of participation, minimisation of harm, anonymity and confidentiality. The participants' were provided thorough information about the study, and assured that the research would not damage grades or teaching standards. Participation was voluntary with no consequence when some students opted out.

Conceptual Framework

Traxler (2007) provided six categories by reviewing existing trials and pilot case studies in the public domain: 1) technology-driven mobile learning, 2) miniature but portable e-learning, 3) connected classroom learning, 4) informal, personalized, situated mobile learning, 5) mobile training/performance support, and 6) remote/rural/development mobile learning. In this research project the approach falls into 'miniature but portable e-learning'. This is due to the 'hybrid' development of the resource to be suitable on mobile devices and as well as computers.

The Pedagogy

The project was designed around the learners' needs. An understanding of the apprentice profile at this stage in their training was necessary and the desire to promote self-direction based the resource around adult learning theory and practice. Andragogy emphasises the value of the process of learning rather than pedagogy that can focus on the individual's learning behaviour (Knowles, 1980). It uses approaches to learning that are problem-based and collaborative rather than didactic, and also emphasises more equality between the teacher and learner. The why of this adopted model is to approach the learner as an adult to facilitate the development towards adult self-directed learning. The andragogy model asserts letting learners know why something is important to learn,

11

how to direct through information, relating the topic to the learners' experiences, being ready and motivated to learn, and overcoming inhibitions, behaviours, and beliefs about learning (Knowles, 1980).

One of Knowles's (1984) assumption about andragogy - that the motivation to learn is internal - is not evident among the apprentice cohort. The apprentices were exam focused and their study exam directed. The m-learning resource was a diversion from the normal pedagogy, regardless of possible benefits, leading to an extra need to motivate for the study. Research into promoting and sustaining motivation led to the use of Keller's ARCS Model of Motivational Design to inform the instructional design of the project (Figure 5).

Keller (2010) proposes a four step instructional design process. The main components of this approach are Attention, Relevance, Confidence and Satisfaction (ARCS). Figure 5 shows the ARCS Model of Motivational Design (Peckham & Fallon, 2004).
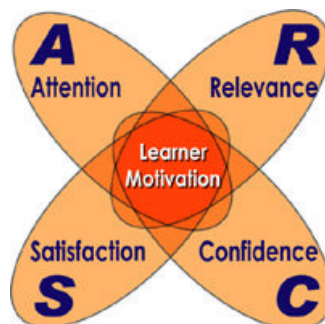

Figure 5   ARCS Model

Attention was gained by offering a new method of content delivery that would maintain interest through exploration, graphics, video and participation. The relevance to the

12

learners was by aligning it to curriculum learning outcomes, their familiarity with the devices and its application towards new learning and study. Confidence was inherent among the learner with the personal control and opportunities for meeting learning requirements. Satisfaction was maintained with a consistent useable resource, positive reinforcement of the topics and videos studied, and discussion around opportunities for this new learning.

The Project

The study focused on one Phase 4 apprentice group attending a block release period of ten weeks. There were 14 students in the group, 12 of whom chose to participate in all or some of the research. The participants were all male between the ages of 18 and 21. This group chosen was the only group in attendance at the Institute of Technology at that time. The project flow is outlined in Figure 6.
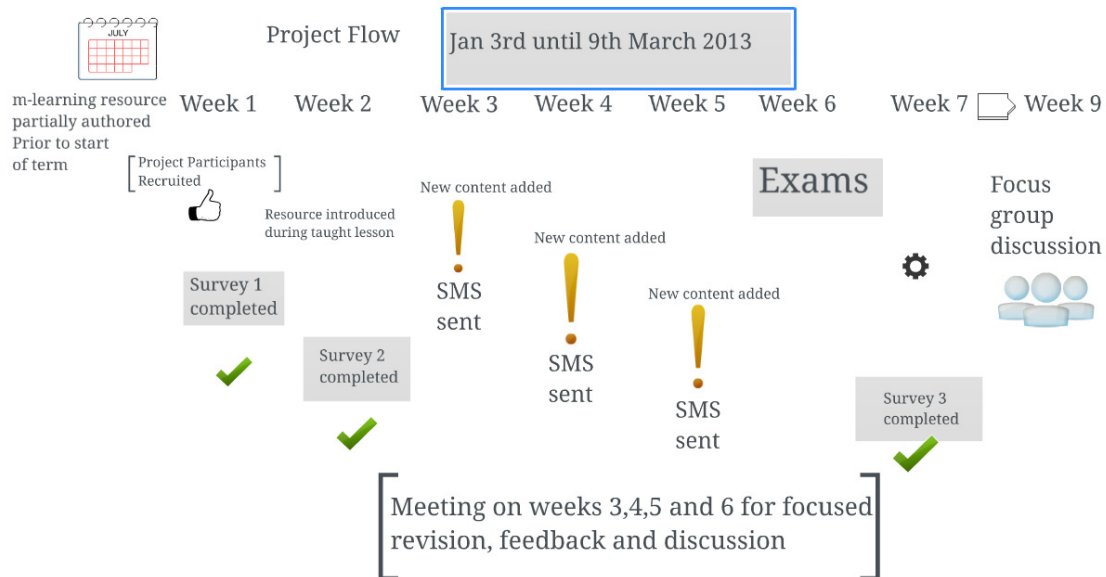

Figure 6   Project flow chart outlining key elements in a timeline

13

On recruiting the students, data was collected in week one, by questionnaire on mobile phones and their usage. A second questionnaire in week two was produced on the individual learning and study of the student. The resource and navigation was introduced to the students during a taught lesson in week two, but the exploration of the site was left to the student. SMS texting was used to encourage engagement with the resource. Google Analytics was inserted to monitor website usage.

A scheduled meeting was held each week with participants for informal discussion and feedback. Opportunities for learning were discussed and their applications in real life settings. Data was received on the engagement with resource and feedback provided on questions attempted by students. Post implementation of the project involved a questionnaire on the resource usage and feedback, followed one week later with a focus group discussion.

Analysis

Data Collection and Findings

1. *Questionnaire on Mobile phones and their Uses*

A separate variables questionnaire was provided on mobile phones and their uses to participating students on the introduction day of the resource to the learners. 83% responded. Then aim was to measure mobile phone types and usage preferences. The individual survey questionnaire was chosen, to allow the student to transcribe and reflect on their personal views without peer influence. The survey consisted of a series of closed questions to facilitate ease of data analysis and some open questions to allow expression of view.

14

All the participants had mobile phones, with 90% having 'smart' phones. 70% were on a Prepay package. All participants had internet capability on their phone; 4 participants did not use the 3G internet on their phone; 3 of the above had no data package from their network provider and connected via 'Wi-Fi' only. Typical Data packages allowed less than 1 GB, most commonly between 1 and 5 GB and unlimited download.

As shown in Figure 7, typical mobile uses were calls, messaging, taking photos and alarm clock. Next popular was games and music. After that it was social networking and watching video. The 4 students who used the phone for browsing their internet usage did so several times a day.

Number of students
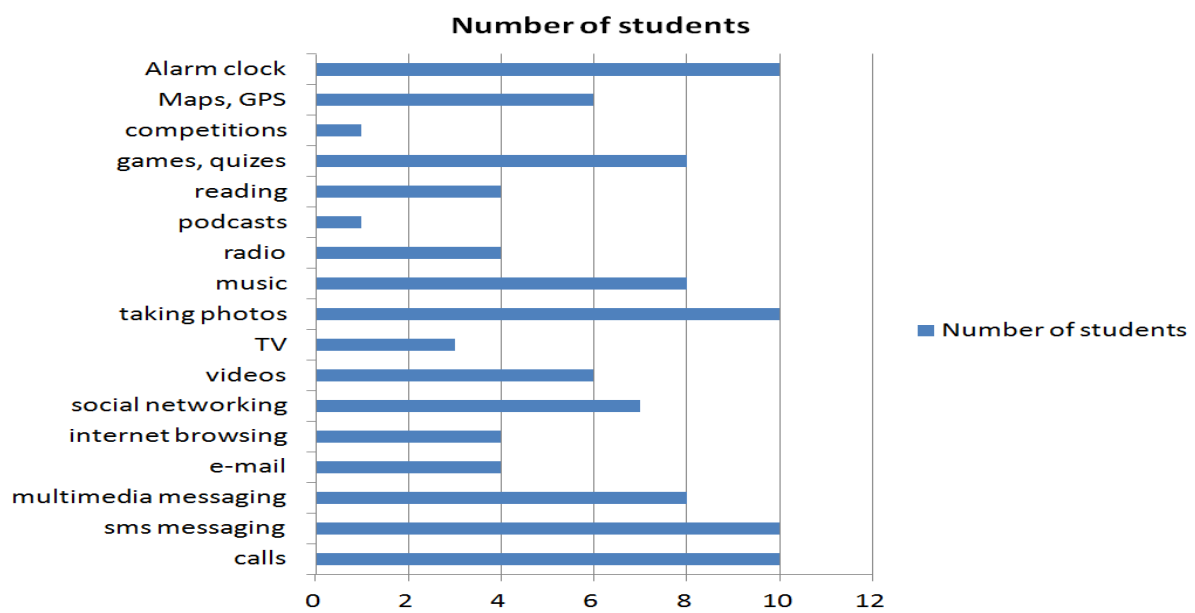
Figure 7   Bar Chart representing phone usage

2. Student Questionnaire on Learning

Questionnaire 2, as seen in Figure 8, provided a series of questions with an aggregated scale, where learners had to highlight which attribute most applied to them, providing data on individual learning and study. 92% responded. The aim from this data was to develop the resource with the leaner needs in mind. An adaption of a survey and

15

questions from a study on profiles in an online environment was used to move closer to this goal (Barnard-Brak, Lan, & Paton, 2010).

The students in the main set a high standard for their work but did not plan ahead. Discussion on this noted that the student prefers to deal with what was in front of them as it arose. The availability of mobile learning any time or any place was not always utilised, but accessed at their own study hub.

16

Category	Items	Very much like me	Somewhat like me	neutral	Not much like me	Not at all like me
Goal setting	I set standards for my work in class	11	1111	111	1	1
	I set, short term, daily or weekly goals for learning		1	111	11111	11
	I keep a high standard for my learning of course material		11111	1111	1	1
	I set goals to manage my study time		1	11	11	111111
	I don't compromise the quality of my work	1	1111111	1	11	
Environment structuring	I choose the location where I study to avoid too much distraction	1111	111	11	1	11
	I find a comfortable place to study	1111	111	1	1	11
	I know where I can study most effectively	1111	1111	1	1	11
	I can choose a time for studying with few distractions	1	11	111	11	111
Task strategy	I take lots of notes in class from what the lecturer is saying	1	111111	11	1	1
	I read my notes aloud to make sense of them	11	1	1	111	111
	I prepare questions to ask the next day in class		1	1	11	1111111
	I find and complete extra questions to master the subject matter taught in class		1	111	111	111
Time manage	I allocate study time daily or weekly, even though there is high class contact hours		11	11	11111	11
	I try allocate the same time every day / every week to study	1	11	1	1	111111
	I distribute my study time evenly	1	1	111	11111	11
Help seeking	I find someone who is knowledgeable in course content when I need answers	11	111111	111		
	I will meet and share the problem question with classmates to find a solution	1	111111	1	11	1
	I will phone, text, or email another student to find a solution to problem questions while studying	1	11	111	11	111
	I will go to the Lecturer to find an answer to a problem question	11111	11	111	1	
Self evaluation	I summarise my learning / studying to examine my understanding	1	1111	1111	11	11
	I ask myself a lot of questions about the course content		11	111111	11	1
	I communicate with classmates to find out how I am doing on topics	1	11	111	1	1111
	I communicate with classmates to find out, if what I am learning is different from what they are learning	1	1111	111	11	1

Figure 8   Results summary of Student Questionnaire on learning

17

It was noted that some students felt they did not study effectively unless they got to 'their' environment. The student is the passive recipient of knowledge and waits for the information to be received. The majority do not plan or set study times. Further discussions noted it was 'if possible' around their everyday lives. The high class contact hours were highlighted and a 'tiredness' towards any study from this. The idea of a mobile resource appealed to 11 out of 12 students where they could access information anytime or anywhere. The one it did not appeal to stated he did not have the phone (smart phone with data package) for it.

The students were proactive in the main in seeking help from peers or tutor to find answers. Discussion noted there was a preference to go to the tutor for help. The self-evaluation was mostly neutral with wide spread interest in communicating with others. Observations from other courses using the Institute's LMS noted there was little interaction on LMS forums for discussion unless it was linked to the assessment. The learner preference of a class group was face to face.

3. Student Questionnaire on Website and Feedback

A post project Questionnaire was filled out by 9 respondents as part of the study after learners completed their mid-phase exams. This captured data relating to how many times they had logged on to the website, when and where.

One student logged on once, two students logged on between 1-5 times and 6 logged on more than 5 times. Times for logging on were mostly in the evening, then lunchtime or before classes. Most logged on after receiving SMS text messages. The preferred location for logging on was at home, the college or Library. Other locations like cafes did not feature, nor did commuting among this sample. This data is similar to a study by

18

Vavoula (2005) on adult learning, where the learner chooses their home or work environment for study, and not while travelling. Discussion on these noted statements like "*I'm not studying when I am out...*" and "*...there was no room on the bus to be taking out the phone...*" Further feedback and suggestions were provided at the end of the questionnaire. A sample of some of the questionnaire is shown in Figure 9.

	A	B	C	D	E	F	G	H	I
Did you log in using a computer or mobile phone?　　computer	O	X	X	O	O	O	X	O	O
mobile phone	X	O	O	O	X	O	X	X	X
If you used a mobile phone,　(a)Were you able to access all the content?	O	O	O	O	O	X	X	O	O
(b)Was the upload speed fast?	O	O	O	O	O	X	X	O	O
Did you find the content useful?	O	O	O	O	O	O	X	O	O
Did you attempt any of the revision questions on the website?	O	X	O	X	O	O	X	O	O
Did you attempt the word search or crossword on the website?	O	X	X	O	X	X	X	X	X
Did you watch any of the videos on the site?	O	O	O	O	X	X	X	X	O
Did you try finding other relevant videos to view that were not on the site?	O	X	X	O	X	O	X	X	X
Did you follow any of the suggested links from the website?	O	O	X	O	X	X	X	X	O
Did you browse the internet to search for course content outside of the website?	O	X	X	O	X	O	X	X	O
Was this a useful resource for learning about the different subjects?	O	O	O	O	O	O	X	O	O
Was this a useful resource for study towards the assessment?	O	O	O	O	O	O	X	O	O
Any suggestions for improvement? Every suggestion will be taken on board	X	X	X	1	X	2,3	X	X	4
					1.	Put past papers on site			
					2.	Site more user friendly			
					3.	Put in same order as taught lessons			
					4.	More past questions			

Figure 9　　　　Sample: Results summary Post project Questionnaire

4. Google Analytics on Website Usage

This provided an overview on the website usage. Data was collected on website usage, pages visited; pages dropped, how long on each page, flow patterns, times, networks and devices used. The rise in visits shown in February was coincided with SMS texting. The rise in visits shown in March was the morning of their summative assessment. The Bounce Rate show the visits in which the person left the site from the entrance page without interacting with the page. Information on the engagement with the resource indicated 33% logged on using a PC, either at home or in the Library. The Google analytics analysis only started three weeks into the project (due to my own lack of knowledge in the area) so a comprehensive analysis was not possible. The missing data would be relevant and would give a clearer quantitative indication, as demonstrated in

19

Figure 10, of the overall interaction with the resource. As this was an add-in later in the study the qualitative data collection was unaffected, and feedback from learners was provided, with weekly meetings that gauged interaction and issues with the website.

Figure 10   Google Analytics data

5. *Focus Group Discussion*

The Focus Group discussion involved the 12 students in the project, the researcher as moderator and the supervising lecturer of the class at the time. The focus groups were seen as valuable tools for exploring how points of view are constructed as well as how they are expressed (Kitzinger & Barbour, 1999).This qualitative methodology was quasi-structured with students and moderator sitting in a comfortable circle around a recording device. The supervising lecturer sat just outside circle. One student present indicated he would prefer to listen only.

20

This element of the data collection provided useful student observations on the research project. A focus group discussion was chosen over individual interviews, primarily based on previous experience of the apprentice learner. It had been found that individual interviews provided data very similar to questionnaire surveys and students were not always at ease in the interview. Also the data from student to student was quite similar. The focus group discussion brought the participants together in a comfortable environment to engage in an interactive discussion. The aim was to achieve the correct balance to provide valuable information which would transfer to other contexts (Lincoln & Guba, 1985).

Student Feedback

The characteristics of the learning that were important to the learner were the availability of content anytime, anyplace and their confidence in the ease of use. Further engagement was noted with the carpentry and joinery subject matter in an online capacity, especially 'You Tube' videos. Some students were 'amazed' at the educational content available. It was also stated, as very important, the inclusion of short videos alongside the 'massive' amount of theory content that was presented throughout their training. This was deemed more possible with the m-learning format where links were part of the text and content "*...so you could go and look at what you were reading about"*. Some learners mentioned the resources potential in work placed situation 'to look up stuff' and have also 'discovered' relevant applications.

Requests were made for more revision content around exam type questions and more relevant visual content. Expanding on this, a 'Discussion forum', hosting previously asked questions and problems, was sought specific to the learning units.

21

There was strong support for the inclusion of a social aspect on the course in the focus group discussion. Facebook was the main suggestion as a link with tutor and peers. The suggestion of Facebook was a contradiction on previous discussion with the learners. Along with the findings in Melrose (2012), the learners at this level had a preference not to use social networks, such as Facebook, as a learning space. Discussion had noted a learner desire to keep their social interactions private. Following on from this, one learner identified the potential of using a Facebook 'page' for updates and information, setting up a 'walled garden' that could be kept private. This generated an interest in the discussion and the learner was quizzed by his peers on how to do this. From the discussion, I perceived a need for the learners to have accessible contact, but through a platform that was not intrusive on their social lives. SMS texting was deemed useful by the learners, but should include a direct link so you "*didn't have to go checking the whole site again*".

The overall feedback on the project and resource was positive and the belief was the idea should be expanded to encompass the entire apprenticeship from start to finish. One student stated it would be "...*handy to access all these notes and info before attending the training. It had been a year since I last looked at a book* ..." and also "...*There was no direct follow on from the notes in my training at Phase 2*".

Project Challenges

At the design stage the student group had not been identified. The resource needed to be accessible by all and available on a Personal Computer to avoid exclusion. Computer room access and Library computers were available to all the learners for those that did not access via mobile phone. The content I was able to offer was unknown until the first day of term, as it was dependant on which lecturer was timetabled and when. I did not

22

wish to infringe on established methods of delivery, so the subjects chosen were in consultation with course lecturers and their timetables.

The summative assessment at mid-phase and end-phase had a narrowing effect that prohibited the move away from exam focused content. Learners mentioned about inclusion of exam type questions on the website. The researcher was aware of the exam focus of the learner. It was felt that if the resource was linked around the exam assessments too much, it would have dispelled the research question and moved the learners' focus from a resource to encourage new learning to just another revision tool.

Several available Learning Management Systems (LMS) were investigated, such as the open source Moodle and the Institute 'Webcourses' by Blackboard, for hosting learning content. I found they were not fully mobile compatible at that time with problems with pop-up windows, tables, iframes, the forms library, the lack of support for grid layouts and poor usability,. The download speed from several sampled LMS was quite slow for mobile usage. In addition some apprentices do not have access to the Institute LMS. The class group is only formed days before start of term by an external agency, meaning there is a registration period within the institute before the learner would have permission to access the LMS. This lead to a shift in focus from proprietary LMS systems towards open source e-authoring and m-authoring tools (Mobeezo, Weebly and Wordpress). At that time each tool investigated had its merits but had compatibility issues (static screens, not playing flash objects, page layout changing) with certain phones. The technology challenge was learning and authoring HTML and CSS to develop the resource. Compatible content were authored and corrected, ensuring file sizes were small to optimise upload speed for mobile phones and minimise impact on

23

mobile data packages. The website was hosted from a Dropbox (online 'cloud' storage) public folder where access was available to those with a link. I noted from other studies in m-learning that a particular device was chosen for similar compatibility and technical reasons (Bradley & Hayne, 2006).

The resource had limitations that did not fully explore all the potentials of m-learning. The pedagogical approach researched in m-learning was inhibited due to technology limitations of the researcher, and as a subject matter expert, the reverse frustrations were in evidence due to lack of technical ability at the time to host certain learning elements. This impacted on the research question, as engaging content such as detailed quizzes or interactive animations were not included, therefore potentially limiting the appeal to the learner. Presentations and videos were utilised, but quizzes were simplistic and lacked built in feedback. The researcher was also aware of the social and collaborative potential not being included. The student observations noted a desire for various levels of contact and feedback. This should be viewed as a missed opportunity and will be addressed in further studies.

The engagement with the resource was mixed. Feedback was positive but this was more around the idea of m-learning than the actual resource. Along with this idea was the fear of actually having time for this interaction within the 10 weeks training. An m- resource should be introduced from day one of the apprenticeship.

Conclusion

> With its strong emphasis on learning rather than teaching, mobile learning challenges educators to try to understand learners' needs, circumstances and abilities even better than before. This extends to understanding how learning takes place beyond the classroom, in the course of daily routines, commuting and travel,

24

and in the intersection of education, life, work and leisure (Kukulska-Hulme, 2010, p.181).

The findings of this case study indicate that most of the learners engaged with the resource, enjoyed the extra resource availability, and liked having notes available outside class anytime. The 'new' and informal way of learning was enjoyed. The learners were comfortable with the navigation using similar methodologies daily on their mobile devices. Satisfaction, was apparent, with the learner in control over content on their own devices. These characteristics of learning were important to the learner as 'an addition' to the lessons in class. This was achieved by scaffolding the taught lesson and offering a different perspective on the lesson content.

The findings on self-directed learning were inconclusive. Several learners followed links to further content and continued to research information not directly linked on the site or with the curriculum. Discussion noted a gaining of knowledge and differing perspective around subject matter in addition to the taught view. Learners said that they 'were doing it for themselves', indicating a level of satisfaction and empowerment in their own learning. The use of the resource for learning around technology has introduced new skills and applications for devices. Discussion noted that this should 'be the standard' for continued and further study.

Discussion indicated that there was increased engagement with the carpentry and joinery subject matter, not specifically linked to assessment content, especially 'You Tube' videos. A study by Hickey, on Irish bricklaying apprentices, has noted positive results in the use of You Tube videos on mobile phones (Hickey & Donnelly, 2011). Hickey has expanded on this research and incorporated the use of these videos in the delivery of modules. Observation of the apprentices in this study noted they were more

25

curious and asked questions around elements of videos not understood. There were further discussions on expansion or adaption of ideas viewed, with peers and tutor. The learner's perceived effectiveness of m-learning was positive. The use of mobiles did promote learning outside the classroom and learners availed of the flexibility. The change in the learning was the availability of content outside of a predetermined location and not prescribed by the tutor.

SMS was effective in this study in gaining attention and increasing engagement. Literature has indicated other studies that show a 'student willingness to use SMS outside a social context' and 'highlight the potential for SMS to support learning in Higher Education' (Jones, Edwards, & Reid, 2009). When the mobile resource was updated with new information, SMS was used to inform of this. Learners logged on to view this new content, and there is future potential for this to be developed.

There was in evidence a heightened interest and self-motivation demonstrated through engagement with the resource and research project. The avenue of self-exploration has been unlocked. Learners found new impetus in study to seek out further information on related subject matter. The learning was noted to be a 'great addition' to the taught lessons in class. The learners were comfortable with the 'face to face' teaching and what was known. The m-learning was viewed as a resource to complement and scaffold the established teaching methods. This blended learning approach worked and was not a complete diversion away from traditional didactic methods. The suggestion from the focus group interview is that delivering online content that is mobile compatible, can promote further engagement with subject learning content outside of the prescribed lessons and hand-outs.

This self-exploration of the learner should be encouraged. It is a way forward and should be approached as a strategy for development and inclusion in the curriculum. Further training would be required for subject matter experts in preparing for mobile learning and collaboration with those of technology backgrounds in production of resources or learning objects. There is a great potential, with a correctly managed resource and strategy, in using m-learning to promote and enhance the learning for the apprentices. The aim is to expand on these findings, like the social connectivity, towards further development of online resources to engage and promote learning.

Recommendations

There is a need in this context for some form of social connection in an online environment. Learner fears would have to be addressed regarding the use of a chosen network having a minimal intrusion on their own 'social' lives. Further investigation is required to establish a suitable forum and boundaries within this area.

27

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29

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30