Case Study: Examining the design and educational considerations in developing and implementing a French course using Moodle for use on mobile devices

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List of Abbreviations

Female students are identified as $F$ and male students are identified as $M$ for ethical purposes

CMS  Course Management System
ComReg  Commission for Communications Regulation
DES  Department of Education and Skills
E-Learning  learning facilitated by ICT
FLOSS  Free Libre and Open Source system
HCI  Human-Computer Interaction
HTML5  Revision 5 of the Hypertext Markup Language (HTML)
ICT  Information and Communication Technologies
LCMS  Learning Content Management System
LMS  Learning Management System
MLE  Managed Learning Environment
M-Learning  Mobile learning
NCCA  National Council for Curriculum and Assessment
OECD  Organisation for Economic Cooperation and Development
OSS  Open Source Software
PISA  Programme for International Student Assessment
TAM  Technology Acceptance Model
UCD  User-Centred Design
VLE  Virtual Learning Environment
3G  Third Generation of wireless Internet
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<td>Fourth Generation of wireless Internet</td>
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Dedication

I wish to dedicate this thesis to my father Michael for all his love and inspiration over the years. Ar dheis Dé go raibh a anam dilis.
Declaration

I hereby declare that this thesis represents my own work and has not been submitted, in whole or in part, by me or another person, for the purpose of obtaining another university award. I agree that this thesis may be made available by the University to futures students.

Maeve Cormican

4 October 2013
Abstract

Case Study: Examining the design and educational considerations in developing and implementing a French course using Moodle, for use on mobile devices by Maeve Cormican

This case study aimed to examine the effectiveness of a Moodle site designed with mobile devices in mind. Mobile devices can be used in a mobile learning (M-Learning) environment which may prove to be more successful than traditional learning for today’s technically minded students. A potential exists to combine mobility in a learning environment to provide learning anywhere and at any time. Students have the opportunity to communicate interactively with their peers or with their teacher at any time, wherever they may be. This case study involved dividing a First Year French class into two groups. The class was divided into two groups based on access to Internet at home and past exam results. Group A students accessed the learning activities and assessments through mobile devices (laptops, tablets and smartphones) and their textbook. Group B students only had access to their textbook. Qualitative and quantitative data collection tools were employed to highlight the learning benefits of Moodle and the textbook. Student motivation, the Hawthorne Effect, multimedia principles and Blended Learning were also examined. The case study found that students in Group A who had access to Moodle and their textbook, consistently outscored the students in Group B.
Chapter One - Introduction

1.1 Introduction

Current learning software is designed for use on desktop computers and on large computer screens. A shift has occurred towards smaller screen sizes. The use of mobile devices for learning has implications for learning theories and for instructional design.

New developments in mobile devices provide location-specific resources. Rich multimedia is also possible due to the wealth of online material. Mobile devices are powerful learning tools. They help enhance learning. Mobile devices support constructivist learning through collaborative activities, an increase in motivation, and interactive learning. This becomes one-to-one interaction which can happen, regardless of place or time. The ubiquity of mobile devices also increases collaborative and independent learning.

The Programme for International Student Assessment (PISA) report “Results for Ireland and changes since 2000” (Cosgrove et al 2009) highlights that while Irish students scored ten points higher than the OECD average for digital reading, their print reading was similar to the OECD average. Irish girls scored thirty-one points higher than Irish boys in digital reading, which was higher than the OECD average of twenty-five points. These positive results concerning digital reading reinforce the fact that money and resources should be invested into Ireland’s future generations.

The introduction of a Virtual Learning Environment (VLE) into a secondary school holds great potential. It can offer learners flexibility and the choice to learn wherever and whenever, due to the popularity and widespread use of mobile devices. VLEs may have the capacity to promote student confidence. They can encourage student autonomy and help develop students’ ICT skills. Students may have the opportunity to communicate and collaborate, in ways not possible in the traditional classroom setting.
1.2 Research Topic

Research Question
The purpose of this research was to explore the effectiveness of VLEs, accessed by mobile devices, in the learning of second-level French. This case study aimed to examine and decide the following:

- How effective is Moodle in the learning of second-level French?
- How effective are mobile devices in the learning of second-level French?
- How do students use Moodle and what factors influence their usage?

Research Context
This research was carried out in a secondary school in the northwest of Ireland. The participants were a group of First Year students of mixed gender. The school has plans to introduce SharePoint VLE after this study.

1.3 Relevance of the study

Objectives of the study
The objectives of this study are to consider the impact the introduction of a VLE, Moodle, would have on learners of French in a secondary school. This study will attempt to assess the benefits and any limitations that the introduction of a VLE would have on students. This case study would provide school management and teachers with the necessary information that would be useful when considering implementing Moodle in their educational institution.

The research undertaken is focused on the use of mobile devices in accessing Moodle. With the astounding digital reading success in the PISA report (2009), this advantage should be exploited and channelled for the benefit of our students. The new Junior Certificate curriculum sees a move away from rote learning to a more investigative approach. Digital literacy skills will prepare the students for their futures. The predominance of mobile devices is a motivation in itself. M-Learning allows learning to take place at any time. The findings of this research would also provide educators...
with an insight of the benefits of M-Learning. The research undertaken as part of this study is useful to educators and management.

1.4 Research Methodology

This research study used a case study approach. Data was collected using qualitative and quantitative research. Students completed an online questionnaire before the Moodle site was developed. Pre-intervention and post-intervention tests were completed by the students. Teacher’s observations, Moodle’s activity reports and student interviews helped triangulate the data. The participants were divided into two groups: Group A and Group B, based on access to Internet and past exam results.

1.5 Structure of the Research Study

Chapter 1 Introduction
This introductory chapter of the thesis examines the background, context and significance of the study. It outlines the author’s aim for the study and reasons for choosing this research topic.

Chapter 2 Literature Review
The literature review examines the literature available on this topic. It is divided into twelve sections. Section One introduces the chapter. Section Two examines Mobile-Learning. Section Three reviews mobile devices. Section Four explores networks. Section Five presents virtual learning environments. Section Six presents Moodle. Section Seven investigates Blended Learning. Section Eight studies government policies. Section Nine considers acceptance. Section Ten examines learning theories. Section Eleven highlights motivation. Section Eleven reviews instructional design. Section Twelve investigates usability.

Chapter 3 Research Methodology
This chapter focuses on the rationale for the choice of a case study. A description is given of the data collection tools used for this study. Reliability and research validity is
discussed. Ethics are also taken into consideration. Chapter Three concludes with a timeline of data collection.

Chapter 4 Research Findings
In this chapter the data and findings are analysed. Quantitative and qualitative results will be presented. The findings are presented in three sections based on the research questions. Initially, the findings relating to the effectiveness of Moodle are outlined. Then, the effectiveness of mobile devices in the learning of second-level French are presented. Finally, students’ use of Moodle and the factors influencing their usage are presented.

Chapter 5 Discussion of Findings
This chapter presents a synopsis of the research and summarises the key findings of this case study. The findings are then discussed in relation to the literature presented in Chapter 2. The three research questions are analysed:

- How effective is Moodle in the learning of second-level French?
- How effective are mobile devices in the learning of second-level French?
- How do students use Moodle and what factors influence their usage?

The inhibiting factors to M-Learning and resolutions are considered along with a discussion of problems which arose during the study.

Chapter 6 Conclusion
This chapter presents the outcomes of this case study, recommendations for the future.
2.1 Introduction

The researcher plans to investigate the current usage of mobile devices within an M-Learning environment in an Irish Secondary School. Moodle will be used as the VLE, to host online French Junior Certificate activities, resources and assessments. A comparison between two groups of students will be carried out. One group will have mobile access to a Moodle site which will have supplementary online activities, resources and quizzes. The second group will learn a topic in French using traditional paper-based teaching resources, such as textbook and teacher’s notes.

Web 2.0

A shift has occurred from traditional teaching methods to student-generated, student-centred learning. Teaching methods have evolved from the traditional teacher-centred, chalk-and-talk, to student-centred learning. The Internet itself has undergone a sea change, transforming from a passive, non-interactive media where users accessed static web content to one rich with social networking sites, blogs, wikis, video sharing and cloud computing. Web 2.0 applications such as Dropbox, SlideShare, Voki, Xtranormal, YouTube and Prezi all facilitate collaboration and personalised learning, boosting learning efficacy.

Digital Natives

Duffy (2008) made reference to engaging the ‘YouTube, Google-eyed generation’. Today’s students use ‘twitch speed’ (Prensky 2001, p.3) and expect instant feedback and responses. Ease of access is important when they create their digital material. According to Prensky, (2001), anybody born after 1980 is a Digital Native. The ‘Nintendo Generation’ is another phrase coined to describe the current generation born after 1980, born into a digital world, where it is believed they are at greater ease with technology, than their parents. Prensky believes that the environment, in which this technical generation grows up, influences how they think and learn. According to Prensky, Digital Natives are used to receiving information fast. He continues by saying that Digital Natives:

Thrive on instant gratification and frequent rewards. They prefer images before text rather than after. They prefer games to ‘serious’ work.
Educators need to rethink teaching methods and course content to cater for the so-called, ‘Digital Native’ students. By contrast, those born before 1980 could be termed Digital Immigrants (Prensky, 2001, p.2). They prefer to print out emails or phone up someone to find out if they have received an email or text message.

### 2.2 M-Learning

Though M-Learning has existed for more than a decade, it is only being taken seriously now due to the popularity of mobile devices, such as laptops, smartphones and tablet computers. In an article in PC Mag in April 2012, it was reported that 63 per cent of US adults now access the Internet using a mobile device (Poeter 2012).

The term M-Learning describes computer-assisted learning which can take place anywhere and at any time and which employs mobile devices wirelessly connected to the Internet. E-Learning refers to learning facilitated by ICT (Information and Communications Technology). Quinn (cited in Ally 2004, p.5) described M-Learning as “the intersection of mobile computing and E-Learning.” M-Learning is a subset of E-Learning. Characteristics of an M-Learning environment include:

- Urgency of learning need
- Initiative of knowledge acquisition
- Mobility of learning setting
- Interactivity of the learning process
- Situating of instructional activity
- Integration of instructional content

Chen et al 2003 (cited in Huang and Liaw 2011, p.146)

M-Learning allows information and learning material to be accessed anytime and anywhere. As a consequence, learners have control of when and where they will learn. For example, students can take voice or text notes while travelling to and from school or while browsing the Internet or completing class online activities. M-Learning facilitates formal and informal learning. This just-in-time learning occurs when a learner takes advantage of a suitable learning opportunity. For example, a student can use the video application on his phone to make a report of industry in his local area. This video can be uploaded to and published on a video-sharing site such as YouTube. High level learning occurs in this instance as learners can access and apply the information immediately. Collaborative and communication-based
activities can be designed that tap into the online activities of teenagers by using social networking sites such as *Facebook* and micro-messaging applications such as *Twitter*.

M-Learning also promotes teacher mobility. Communication can be made with students anytime and anywhere. Teaching and learning is no longer restricted to the four walls of the classroom or between the start and end of the school day. This teacher mobility benefits both sides of the learning equation. Teachers can notify students about upcoming exams or chapters to be read through broadcast messages or reminders pushed to online calendars such as *Microsoft Outlook*.

Current obstacles to a more widespread adoption of M-Learning include the limitations of 3G access through geographical dead zones and the minimum monthly cost that are prohibitively expensive to secondary students. There are three main components of an M-Learning environment: mobile devices, wireless networks and the VLE.

### 2.3 Mobile devices

Mobile devices are electronic devices that allow people to access their data and information from anywhere anytime. For the purpose of this study ‘mobile’ devices will refer primarily to laptops, smartphones and tablet computers. On the surface, mobile devices are not designed for learning. They are used for social interaction and leisure activities. On further reflection, however, many possibilities arise. Today, learners have highly powerful smartphones or tablet computers as personal possessions. Growth in media sees an increase in decision making and choice concerning access to information. New learning habits have developed. Users are faced with increased choice; are forced to make decisions and take risks.

Mobile digital technologies play a large role in children’s lives today. If used carefully, they could improve learning considerably. The report “Pockets of Potential: Using Mobile Technologies to Promote Children’s learning” (Trotter 2009), calls for increased investment in research into the potentials of mobile devices for learning. The author of this report claims that though mobile devices are “a source of fun and entertainment”; they have “significant potential to be a key ally in supporting learning experiences” (Trotter 2009, p.1).
Features of mobile devices that make them beneficial from an educational context are “portability, functional, ubiquity, personal ownership, social interactivity, context sensitivity, location awareness, connectivity and personalisation” (Bachmair et al 2010, p.3).

Mobile devices offer personalised or individualised connectivity. Mobile connectivity improves collaboration via real-time or instant interactivity that may lead to better decision making. Mobile connectivity enhances users’ orientation or direction.

BenMoussa 2003 (cited in Huang and Liaw 2011, p.146)

Futurelab (2004) reiterates such personalised and portable learning. According to Futurelab, the popularity of mobile devices is itself a motivator to use them. Mobile devices are generally used by a single user. Mobile devices permit a ‘personalised’ learning experience and the ownership of the device is an added incentive to learn.

Passey (cited in Becta 2003, p.2) referred to student pride and the sentiments of “ownership” of work. Consequently, individual and independent learning opportunities take place through the use of mobile devices as students can learn when it best suits and when they are ready to learn. They can be taken from place to place and are portable. Soloway et al 2001 recommend that “to make any difference in the classroom at all, computers must be mobile and within arm’s reach” (Futurelab 2004, p.7).

Census 2011 figures reveal that secondary school students’ bus journeys to school take on average 28.20 minutes, while car passengers’ journeys to school average 14.40 minutes (Central Statistics Office 2012). Depending on Internet connectivity and greater 3G access, this time could potentially be actively spent completing online learning activities using mobile devices.

“The prevalence of mobile technologies is in itself a motivator to exploit them for learning” (Futurelab, 2004, p. 6). The dramatic increase in the use of mobile devices has prompted the researcher to examine the potential of using these tools to compliment and support traditional teaching methods of French. In its ICT survey for 2013, the Commission for Communications Regulation (ComReg 2013) found that 97 per cent of the population use mobile phones for telecommunications while 69 per cent use landlines. 75 per cent of the population owned a laptop while 54 per cent owned a smartphone.
Research conducted in Ireland in 2011 by Amárach Research (Figure 2.1), found that 46 per cent of Irish adults own a smartphone and 11 per cent own a tablet computer (Amárach 2011). Half of all smartphones are owned by those aged less than 35 years, whereas tablet computers are mainly owned by those aged between 25 years and 44 years. Smartphones are more popular than tablet computers for those aged between 18 years and 24 years.

2.4 Networks

There are two different wireless networks that currently allow Internet access, Wi-Fi and 3G (Third Generation). Wi-Fi Internet access is gained by using a router to wireless connect to an ISP (Internet Service Provider) There are 4 main protocol standards. The newest and fastest is 802.11n. Older standards include 802.11b, 802.11a and 802.11g. Wi-Fi has limitations as the range of the wireless communication is limited by the router and the construction type of the building. This, however, can be argued not to be total mobile Internet access as it is restricted to a building or area. Complete mobility is achieved through 3G as Internet access can be got wherever there is mobile phone signal. Currently there are four operators in Ireland that provide 3G access, ‘Three’, ‘Vodafone’, ‘O2’ and ‘Meteor’ (ComReg 2013). 4G networks are currently being rolled
out which will offer significantly faster upload and download speeds. 4G will open up increased mobile multimedia opportunities to teachers and students from autumn 2013.

### 2.5 Virtual Learning Environments

Virtual Learning Environments (VLE) are also known as a Course Management System (CMS), Learning Content Management System (LCMS), Learning Management System (LMS), Managed Learning Environment (MLE), Learning Support System (LSS) or Learning Platform (LP). They have become fundamental for the online delivery of education courses. A VLE is:

> Designed to act as a focus for students’ learning activities and their management and facilitation, along with the provision of content and resources required to help make their activities successful.

(Staffordshire University 2012)

#### Choice of VLE

The selection of a VLE in an institution can invoke much debate. Issues arising from system intuitivism may invoke problems. Research by Rosen (Daniels 2012), found that Moodle is the leading VLE in higher education, with a 54 per cent foothold, while Blackboard VLE has 45 per cent market share. The choice of VLE is crucial and will depend on many factors. VLEs are classified into open source and commercial. Open source software (OSS) is free to download and use, whereas commercial VLEs require the purchase of a licence. While some like Blackboard and WebCT are commercial, others such as Moodle and Sakai are open source. Institutions that use open source VLE may adapt the code and develop plug-ins to suit their needs. Hundreds of projects from developers can be found in the Moodle plug-ins directory. Alternatively some institutions have developed their own VLE to meet their own requirements.

#### Features of VLEs

A VLE “is a website that engages students in various learning activities” (CAPDM 2011). Students learn and remember more when they see and they do. As Tannenbaum (1998) asserted, people remember ten per cent of what they hear and thirty per cent of what they read. However, they remember about eighty per cent of what they see and do.
Engagement occurs through audio, video and application sharing to promote collaboration. Students can access courseware, self-assessment material and quizzes in a VLE.

VLEs may also be used as a repository for class materials and provide an online library, hosting reading materials. VLEs permit the posting of course syllabi and class material, which students can refer to in their own time. This sharing of resources supports collaboration. By using VLEs, teachers are able to adapt lessons to suit individual needs, so that students can work at their own speed.

A VLE is a designed information area, where multi-authoring and information sharing occurs (Dillenbourg 2000). Users can communicate in non-verbal ways such through the use of Web Whiteboards. Web Whiteboards are examples of shared spaces. This is an online whiteboard where users can add, see and share objects in real time during a meeting. In online conference meeting rooms, presenters and students also have the facility to share content onscreen using a ‘Share pod’. VLEs have features or ‘tools’ such as blogs or wikis. A blog is an online journal, allowing opinion sharing, with one or multiple contributors. A wiki allows multiple authors. Collaboration occurs through this team writing and the ability to edit each other’s work. This is also an example of ‘Peer tutoring’. “Students were often able to frame concepts in ways that other students could understand and learn” (Blackboard 2010).

Dillenbourg adds that it is a social space with social interaction occurring around the information. Students can see who else is interested in a space and thus, the space becomes more social. Users may see the names of other users online at a given moment. Researchers have coined this ‘space’ as ‘place’. “Places take their sense from configurations of social actions. Places provide what we call appropriate behavioural framing” (Dillenbourg 2000). By using VLEs, institutions can deliver course content and communicate with learners. Peer discussion groups, forums and conferencing encourage a greater social setting, permitting learners to integrate with their colleagues and contribute to the learning. Research has found that by the third meeting, online conferences show similar patterns to face-to-face meetings (Shlager et al cited in Dillenbourg 2000). Through the employment of VLEs, self-guided learning is
facilitated. Collaboration and group work occur through student projects and presentations.

Role of the teacher

A VLE is not a panacea – it will improve flexibility and access to a wide range of content and support. It won’t, of itself, automatically improve teaching and learning, unless it is implemented with a clear understanding on the part of the staff of the role the VLE will play within a given course or programme of study.

(Minshull 2001, p.7)

A VLE possesses a range of benefits for the tutor: collaborative, communicative and assessment. Cradler and Bridgforth 1996 (cited in Murphy and Rodriguez–Manzanares 2009), describe technology as a “catalyst for education reform.” Teachers need to change their style of teaching, from a didactic style to that of a facilitator. Educators are more facilitators than educators. We see the shift from the ‘sage on the stage’ to the ‘guide on the side’. While in traditional classrooms, teachers possess body language, some teachers have found that they have more student contact in online class.

Student tracking is an important feature of VLEs. As tutors can monitor student results and log-in history, better learner support is possible. VLEs compliment the traditional classroom setting. They reinforce class material through the integration of Web 2.0 tools.

VLEs are an important assessment tool. Online tests or quizzes are useful to students and teachers, as immediate feedback can be given and any remedial action can be taken at an earlier stage. Juwah et al believe that tutor feedback is fundamental in helping students understand a concept (JISC 2006).

VLE success

Online collaboration results in improved academic performance. Results and performance of ‘at-risk’ students improved through collaborative Blackboard courses. “The more engaged a student is during a course, the more successful that student will be” (Blackboard 2011, p.2). Higher results and grades were noted by students using the Blackboard Collaborate VLE. Reading results improved by 25 per cent, writing improved by 52 per cent and maths improved by 17 per cent. In a further survey in 2011 (Blackboard 2011), 85 per cent of respondents believed that technology played a growing role in student engagement and participation.
In 2009, a cross-institutional survey was carried out by Cosgrave *et al* studying students’ usage of VLEs in Irish third-level institutions. It was found that the VLE is used very frequently in third-level institutions in Ireland. It was also discovered that students mainly use the VLE as a lecture note repository (75 per cent of respondents) and to upload assignments (58 per cent of respondents). However, it was noted that online quizzes are used by only 14 per cent of students. Lecturers’ hesitancy in using VLEs was cited as a barrier to student use. It was remarked that lecturers do not use the VLE to its potential. It must be noted, however, that increased use of the VLE does not automatically imply better teaching. Cosgrave *et al* discovered that ease of use and system intuitiveness were found to be enablers to VLE usage. VLE availability did not reduce the attendance rate at lectures by students.

### 2.6 Moodle - A new kind of learning

Moodle is a VLE. It was founded in 1999 by Martin Dougiamas. The Moodle community is a Free Libre and Open Source system (FLOSS). It is now available in 223 countries and has 72069 registered users. On its home page there is the following description:

Moodle is a course management system – a free, Open Source software package designed using sound pedagogical principles, to help educators create effective online learning communities.

(Moodle 2012)

**Moodle for mobile**

Moodle is becoming more mobile-friendly. For instance, its MyMobile’ theme (skin) is especially designed for use on mobile devices. It gives a mobile-friendly interface to Moodle functionality. Moodle’s default interface consists of three columns, but when using a smartphone, it has one column. Though Moodle’s default interface is mobile-friendly, inputted content can reduce its usability. It is not advanced enough to make content entirely mobile-friendly, so the content developer needs to format it to make it suitable for mobile devices. Figures 2.2a – 2.2c depict Moodle’s MyMobile theme, specially customized for smartphone browser screens.
Figure 2.2a: Moodle’s MyMobile theme

Figure 2.2b: Moodle’s MyMobile theme
Moodle can be used on a mobile device by downloading a native app, such as the official ‘Moodle Mobile’ app. ‘Moodle Mobile’—a HTML5 and PhoneGap app has replaced ‘My Moodle’, Moodle’s official iOS app. ‘Moodle Mobile’ is a cross-platform mobile client, compiled for simultaneous use on all mobile platforms. ‘Moodle Mobile’ runs on HTML5, which means greater innovation. HTML5 will improve mobile web experiences, in that browsers will not need Flash plug-ins. It was launched with Moodle 2.4 in December 2012.

The design of the ‘Moodle Mobile’ theme is suitable for mobile learning. Moodle 2.4 has its mobile theme (skin), designed with mobile devices in mind. As a result, course content and buttons are more visible on smaller screens. On a smartphone, the interface consists of one column. Buttons titled such as ‘blocks’, ‘settings’ and ‘navigation’ guide the user.

There are few statistics regarding the use of mobile devices in accessing VLEs in Irish secondary schools. While Daniels (2012) claimed that a greater number of students are using mobile devices to access their VLE, according to Cosgrave et al, only a small
proportion of students accessed VLEs using mobile devices in their study. This is especially astonishing considering the scale of mobile device use in Ireland.

2.7 Types of Learning

Blended Learning
While VLEs facilitate online teaching, they can also compliment traditional teaching methods in a school, in a practice known as Blended Learning. Here, traditional face-to-face learning is combined with online learning. There are six types of Blended Learning: Face-to-Face Driver, Rotation, Flex, Online Lab, Self-Blend and Online Driver (Heick 2012). Teachers deliver most of the curriculum in a Face-to-Face Driver. Supplementary online learning is available. Rotation occurs when students rotate between online learning and classroom learning. Flex arises when the majority of the curriculum delivered online, with occasional support sessions. Online Lab Blended Learning delivers the entire course online. Self-Blend takes place when students elect to take some courses online to reinforce the traditional curriculum. Online Driver sees the teacher and online platform deliver the curriculum. Students work at home and person-to-person meetings are necessary. In an online report by Heick (2012), it was revealed that in 2009, more than three million primary and secondary students completed an online course in the United States. It is projected that by 2019, 50 per cent of high school courses in the United States will be delivered online. Schools are physical places which offer opportunities for personal relationships and peer interaction. Blended Learning facilitates the adaption of students’ learning using technology and face-to-face learning. Reed believes that Blended Learning “captures the best of both worlds” (cited in Natsu 2010, p.23). Statistics from Wright State University, in the US, reveal that students who use Blended Learning have a 12 per cent higher rate of completion of courses than students who attend solely face-to-face courses (Blackboard Collaborate, 2010).

Collaboration
Collaboration, self-guided learning and autonomous learning are dominant in constructivist learning environments. Vygotsky asserts that people develop skills and strategies from observing their peers, in a process known as scaffolding. Scaffolding is
a learning theory that recommends social and instructional support for students. Vygotsky believed that students must be taught material within their ‘zone of proximal development’. Students develop a relationship with the material and just like scaffolding supporting a newly constructed building; it is removed when the lesson is understood.

**Situated learning**

In 1991, Lave and Wenger developed the notion of ‘situated learning’ (Bachmair *et al* 2011). Situated learning suggests that learning is increased when it takes place in an authentic situation genre of learning as they are available in different circumstances. Blogging can help teach research. According to Hanks, “learning as meaning-making occurs in situations which are now in the hand” (cited in Bachmair *et al* 2011, p.24). Handheld mobile devices are suited to this and writing skills. Blogs can be supplemented with images, video and other digital media.

**Context sensitivity**

According to Tella, mobile devices have the potential to augment learning and that “motivation is enhanced based on needs and context” (Tella cited in Ally 2004, p.1). Context sensitivity is defined as when contextual data and objects combine, to give a greater meaning, therefore greater understanding occurs (Bashmair *et al* 2010, p.44). Content or situations can be documented, recorded, photographed, stored for future reference or emailed immediately. With developments in smartphones and tablet computers, more and more features are available on mobile devices: communication and rich Internet functionality.
2.8 Learning theories

Constructivism
Constructivism is a learning theory that emphasises how we create meaning of the world by personal experiences, observation and interpretation. The information is then processed into personal knowledge. Learners are active constructors of this knowledge. It is a learner-centred model for learning. M-Learning facilitates constructivism, as learning from any place and any time can be put into context. Mobile devices encourage learners to actively construct knowledge. Mobile devices allow realistic contextualising of knowledge. Participatory simulation is a type of learning where learners are actively engaged in situations. Mobile devices are used to quantify the research. Learners are guided through the experiment using their mobile devices.

Moodle’s development is based on “social constructionist pedagogy” (Moodle 2012). Constructionism is influenced by constructivism. Constructionism is a learning theory advocated by Seymour Papert. Constructionism is an active learning process whereby learners learn by doing and making. A Wiki website is an example of Constructionist learning in action; the web page is written and edited collaboratively. Peer review occurs. The teacher acts as the guide-on-the-side. Technology is the tool used to create and edit it. Active learning and tangible results are visible in this case. With Social Constructionism, learning is not only a social activity; it guides how we learn in general, not specifically in computer environments. Knowledge is reinforced when it is used in the wider community. Papert used Information Technology in the classroom through his development of the computer programming language, Logo, to teach mathematics to Primary School children. Mobile devices provide the tools, along with the platform for realistic learning situations.

2.9 Learning Styles
Howard Gardner believed that students have different types of minds and therefore, learn, process, remember and understand material in different ways. Gardner identified seven types of intelligences. Each learning style uses different parts of the brain. They are:
• Visual
• Aural
• Verbal
• Solitary
• Social
• Logical
• Physical

According to Gardner, we all possess a combination of these intelligences. What differentiates us is their combination and how they are used. Each person has preferred learning techniques. Everybody has a mixture of learning styles. Learning styles influence and guides the way one learns.

Verbal learners use words effectively. They love to read, write and make up stories. These learners have developed auditory skills.

Visual learners learn through seeing. They like to draw and read maps. They can be taught using drawings and physical imagery.

A variety of decisions must be made when selecting media which is appropriate to learning styles. A mix of media is most effective.

Butler and Mautz discovered that multimedia was very beneficial to visual learners but unfavourable to verbal learners. They found that adding animated pedagogical agents does not seem to increase learning and may diminish instructional effectiveness, because agents often produce cognitive overload for students.

(Krippel et al 2010, p.4)

According to Mann et al (Krippel et al 2010) personality types influenced multimedia success. They believed that people who were introverted or intuitive would favour multimedia learning, while extroverted people would prefer lectures. Krippel et al argue that there is no evidence to prove that multimedia designed to accommodate different learning styles, increases student learning outcomes.
2.10 Motivation

Motivation is classified into two types: intrinsic motivation and extrinsic motivation.

Deci and Ryan believe that a person’s type of motivation is due to pre-existing attitudes and goals. In their Self-Determination Theory (1985), they distinguish between Intrinsic and Extrinsic motivation. Later, they contend that “the quality of experience and performance can be very different when one is behaving for intrinsic versus extrinsic reasons” (Deci and Ryan 2000, p.55).

Intrinsic motivation exists when the person is driven by an interest in the task, rather than depending on a reward. Intrinsically motivated students are willing and eager to learn new material. An intrinsically motivated person is inspired “to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards” (Deci and Ryan 2000, p.56).

Extrinsic motivation comes from outside an individual. Extrinsic motivation refers to the performance of an activity in order to receive money, an award or recognition.

Computer based learning increases student motivation. In a multimedia environment, the student can experience images, sound animation and video. Students are actively learning. Group work and projects are done collaboratively. Students learn from each other. The novelty of using multimedia adds to the fun.

The Hawthorne Effect

Researchers at Harvard University studied the relationship between productivity and work environments. They examined the workers’ conditions at the Hawthorne Electric Company in Chicago and they found that productivity increased - regardless of working conditions improving or diminishing - simply due to the attention of the researchers to the subjects of their research. It was concluded that the increased productivity was due to the attention paid to the workers – not due to changes in working conditions.

The Hawthorne Effect is a form of reactivity. It occurs when participants’ attitudes as a result of being involved in a study, influences the way they behave. It is believed that performance and production increases when participants are appreciated or watched.
Therefore, any differences in performance between the two groups involved in the study may be due to the attention given to the experimental group.

2.11 Acceptance

M-Learning Acceptance
According to research by Huang and Liaw (2011, p.155), four indicators are present for M-Learning acceptance. They are:
1. Learner autonomy of using M-Learning
2. Perceived interaction of using M-Learning
3. Quality of M-Learning functions
4. Perceived satisfaction of using M-Learning functions

Technology Acceptance Model
Davis et al (1989) proposed the Technology Acceptance Model (TAM).

According to the TAM, user acceptance of technology is based on three factors: perceived usefulness, perceived ease-of-use and behavioural intentions (Smarkola 2011). Perceived usefulness is the degree a person believes the system will increase his performance. Perceived ease-of-use is the degree to which a person believes it will be easy to use. Davis proposed that perceived ease-of-use had a direct influence on perceived usefulness. Perceived usefulness and perceived ease-of-use influenced facilitated acceptance according to Davis. He also found that intentions were a good predictor of use. The TAM has also been used to investigate student acceptance of online courses and the benefits of educational websites.
2.12 Instructional Design

Siemens describes Instructional Design as:

The art and science of creating an instructional environment and materials that will bring the learner from the state of not being able to accomplish certain tasks to the state of being able to accomplish those tasks.

(Siemens cited in Telg 2012)

Instructional design is influenced by constructivism. According to Tchounikine (2011, p.6) “design is never addressed without some anticipated uses and contexts of use in mind.” Software which is designed for educational use is called educational software. Educational concerns need to be taken into account. Pedagogical considerations, design ideas, software components and how learners use software will influence its design.

Educational software will usually be designed with its use in an institutional setting in mind. Software design for informal learning also requires a clear definition of its intended setting. For informal learning, software which encourages making connections with previous experience assists contextually. This building on previous experiences has constructivist origins.

In view of the rise in use of mobile devices in education, educators need to design learning material for use on mobile devices. The design of learning resources must be based on valid instructional design principles and on reliable learning theories.

W3C Mobile Web Best Practices

The World Wide Web Consortium (W3C) has an aspiration that the Internet will be available on as many types of devices possible. It is currently concerned with mobile web applications and the progress in HTML5, CSS3 and many JavaScript APIs. It also works to bridge the digital divide in areas where Internet access is problematic. In 2011, the W3C issued guidelines of ‘Mobile Web Best Practices’. It is envisaged that web designers will “broaden their audience, create effective websites and applications, and make browsing the web convenient on more devices.” The ten concepts are:

- Design for one web
- Rely on web standards
- Stay away from known hazards
- Be cautious of device limitations
- Optimize navigation
• Check graphics and colours
• Keep it small
• Use the network sparingly
• Help and guide user input
• Think of users on-the-go
  (W3C 2011)

**Interface**

“A picture is worth a thousand words. An interface is worth a thousand pictures” (Shneiderman 2003 cited in Costello *et al* 2012, p.153). The interface should be designed, using the minimum of text.

VLE interfaces range from text-based to 3D graphics. While aesthetics and usability are to be considered, Dillenbourg believes that content provided is the main concern.

In research by Ahonen *et al* (Ally 2004), E-Learning courses delivered on mobile devices can be problematic, with students citing the small screen size as a problem. Considering the screen sizes of mobile devices, presentation must be taken into account, so that students can process the material. Miller (Ally 2004) stressed that because of our short-term memory capacity, information should be divided into between five and nine important units. Critical reflection is essential in M-Learning as information will be presented in units and learners will need to understand the overall structure to connect and make sense of the units.

**Interactive Multimedia**

Despite the array of technological tools available nowadays, their effectiveness is unclear. Teachers today have the challenge of engaging students while increasing student learning outcomes. The Theory of Multiple-Channel Communication declares that when information is presented using multiple channels, increased reinforcement and greater retention will take place. Tannenbaum defines multimedia as the use of at least of two of the following: audio, text, graphics and video (Krippel *et al* 2010). Tannenbaum recommends that multimedia must contain an interactive component. *Adobe Captivate’s* interactive PDF documents are superior to *PowerPoint*. Though *Adobe Captivate* contains text, audio, video and animation, it also contains interactivity and quizzes. This media-rich interactive content lends itself to better learning experience for a wider range of learner types.
According to Drave (Krippel et al 2010), for a successful learning outcome, the quality of interaction is more important than the content.

As Tannenbaum (1998) believed, people remember 80 per cent of what they see and do, while they only remember 10 per cent of what they hear.

2.13 Usability

Usability is the ease with which a website can be used. This is even more important with mobile devices than with larger screen devices due to the limitations of the input interface.

**Usability in Open Source Software (OSS)**

Generally, usability is not considered in the design of OSS such as Moodle due to cost. Developers depend on feedback from community members to ensure the user interface (UI) meets user needs. Nielsen’s usability testing (Savolainen 2010), involves observing users and analysing what aspects they find good and bad. Nielsen and Landauer found that by testing on five users, 85 per cent of a site's usability problems will be revealed (Krug 2000). Nichols et al (Savolainen 2007) discovered that usability features are often added in after data and software structures are completed. Trudelle (Savolainen 2010) further believes that research and design stages are omitted. It is generally believed that usability is a constraint in OSS.

Usability is “related to specific people using the system to achieve specific goals in a specific context of use” (Savolainen 2010, p.8). However, Nielsen and Bodker argue that since developers do not generally comply with usability recommendations in OSS, software becomes abstract and impersonal (Savolainen 2010, p.6). However, the rate of usability bugs or problems in Moodle is low.

**Usability in Moodle**

Though Moodle aims to bridge technological and pedagogical ideas, it has usability weaknesses. In Savolainen’s opinion, Moodle’s usability could be better. Human-Computer Interaction (HCI) is not considered.
Navigation
Navigation on mobile devices should be automatic and intuitive. Proper navigation should be incorporated onto an interface to allow seamless movement between screens. Though satisfactory on desktop computers, top navigation bars can be problematic on mobile devices. Too many items either force the designer to make the buttons smaller; causing ‘fat finger’ syndrome, where it is difficult to touch the button or to expand the navigation bar, using up Nielsen’s valuable screen ‘real estate’.

Designing for the small screen
A successful mobile site or app depends on being intentionally designed for the small screen. Some designers do not design with small screen in mind. Features must be limited for small screen size. As Nielsen (2012) terms screen space “the world’s most valuable real estate”, it should be used wisely. Problems arise from small screen size, inputting problems, slow downloading speeds and poorly-designed sites failing to consider mobile usability.

Obstacles
Some activities cannot be displayed accurately on small screen. Small screens have a limited number of pixels, making reading difficult. To counteract this, Krug (2000) recommends using a sans-serif font such as Arial or Verdana, which can be easily read at smaller font sizes.

Moodle permits the use of a wide selection of contrasting colours and larger sized fonts for those with a visual handicap. Moodle facilitates screen readers such as ‘Fangs’ for blind people. Moodle avoids many barriers to accessibility, such as Flash and Java.

Nielsen highlights small keyboards, awkward input, download delays and poorly designed sites as barriers to accessing websites from mobile devices. Alier concurs pointing out that many mobile devices have restrictions due to small keyboards. Alier (2007) suggests it is unlikely that these will be the principal method of data input. It is believed that teachers and students still use larger screen devices to access VLEs. Alier’s study of log analysis show that a large percentage of VLE sessions last a short time. Study of log analysis carried out in Universitat Politecnica de Catalunya revealed that users log in quickly to check recent posts, forums, grades or new events.
2.14 Government Policies

At the time of writing this study, three hundred and forty Moodle sites are registered in Ireland. This list probably underestimates the scale of Moodle usage nationally, as institutions are not obliged to register with Moodle. A list of institutions in Ireland using Moodle is available on the Moodle website.

The NCCA (National Council for Curriculum and Assessment) ICT Framework aims to explore “the potential of ICT to create, communicate and collaborate to organise and produce information” (NCCA 2007, p.4). Guidelines are given for the implementation of collaborative online projects from infant classes, through to Junior Cycle. According to the ICT Framework, students demonstrate learning when they can:

- Use a variety of ICT communication and collaboration tools (for example, mobile phones, PDAs, webcams, GPS, email, VLEs, chat rooms, discussion forums, IM (instant messaging), blogs and social networking websites
- Participate in and contribute to collaborative online projects using ICT (e.g. email, video conferencing, blogs, Wikipedia and podcasts

(NCCA 2007)

The Department of Education and Skills (DES) report ‘Investing Effectively in Information and Communications Technology in Schools 2008-2013’, recommends the use of VLEs “to build and share content” (p.19). The report outlines that when ICT is used correctly it:

Enriches learning and enhances teaching. It invigorates classroom activities and is a powerful motivational tool that encourages learners to progress in more personalised and self-directed ways.

(DES 2007, p.1)

This report recommends that schools’ broadband providers “make available a range of centrally-provided broadband services to schools including email, VLEs and web-hosting” (DES 2007, p. iv). It also suggests that further research be done to investigate the use of mobile devices in accessing VLEs.

As seen at the start of this paper, there has been a move towards M-Learning due to the increase in combined mobile and web access. Consequently, there has been a shift to accessing VLEs on mobile devices. This new kind of learning needs to be an extension
of the VLE, not a replacement. According to Kolowich (Daniels 2012), schools are gradually altering their VLE to improve their functionality with mobile devices.
Chapter Three - Methodology

3.1 Introduction

This chapter examines the research methodologies, data gathering methods and sampling rationale used in this study. The researcher will justify the data collection methods chosen.

3.2 Research questions

“Research questions are the best defence against overload”, according to Miles and Huberman (1994, pp.22-23). In order to select the most suitable research methods and data collection tools for this study, the following research questions were asked:

- How effective is Moodle in the learning of second-level French?
- How effective are mobile devices in the learning of second-level French?
- How do students use Moodle and what factors influence their usage?

3.3 Research setting

The target population

The target population for this study was a First Year French class in the northwest of Ireland. There are twenty-one students in the class, seven boys and fourteen girls. All twenty-one students in the First Year French class were invited to participate in this study (Appendix A). One student chose not to participate. The class was then divided equally into two groups; Group A and Group B, ensuring each group had a similar gender divide, a similar range of class test results and Internet accessibility. This target group was chosen as the researcher taught in the school and could easily access the group.

Physical setting

The research environment for this study consisted of a physical classroom and the Moodle VLE. This school was chosen as the researcher taught French here. The school was due to introduce the Sharepoint VLE after this research.
Online Moodle environment

Students were given usernames and passwords to access Moodle. Moodle was designed to complement material taught in class. The topic chosen for this case study was ‘Les Animaux’. Vocabulary and grammatical reinforcement activities were incorporated into Moodle. Each weekend, a weekend task was given, whereby students had to complete and submit the assignment online.

3.4 Research Methodology

Research has been defined by Salkind (2009) as “a process through which new knowledge is discovered” (Cottrell and McKenzie 2011, p.2). Opie describes methodology as:

The theory of getting knowledge, to the consideration of the best ways, methods or procedures, by which data that will provide the evidence basis for the construction of knowledge about whatever it is that is being researched, is obtained.

(Opie 2004, p.16)

Action research

Kurt Lewin, along with John Collier, was the forerunner of action research. Lewin advises that action research was a tool for learning and change. According to Lewin:

An action research experiment must not only express theory but it must express theory in such a way that the results of the experiment can be fed directly back to the theory.

(Lewin, cited in Bradbury and Reason 2005, p.17)

Lewin recommends that experiments be done in a realistic setting, rather than in a laboratory. He advises that environment influences behaviour (Bradbury and Reason 2005, p. 38). Cohen et al (2000, p.8) assert that the social world can only be understood from the viewpoint of individuals who are part of the action being investigated. Action research involves two things: action and research. Action is about what you do; while research is learning about and justifying what you do (McNiff and Whitehead 2010, p.5). Denscombe reports that the aim of action research is:

To arrive at recommendations for good practice that will tackle a problem or enhance the performance of the organisation and individuals through changes to the rules and procedures within which they operate.

(Denscombe, cited in Bell 2010, p.7)
Case study

In order to carry out this research, a case study was used. Nisbet and Watt suggest that case studies involve the study of a particular situation to explain a more universal belief.

Case studies investigate and report the complex dynamic and unfolding interactions of events, human relationships and other factors in a unique instance.

(Cohen et al 2000, p.181)

Adelman et al assert that a case study is “the study of an instance in action” (cited in Cohen et al 2000, p.181). Case studies involve “the in-depth study of one individual, program, community, setting, or event for a defined period of time” (Cottrell and McKenzie 2011, p.10). Rather than presenting abstract concepts or philosophies, case studies provide relevant examples of people in realistic, everyday conditions. Real people in authentic situations enable us to understand complex theories more clearly. Indeed case studies can function in settings, where quantitative analysis may not be appropriate. Yin (1994) recommends that “the more a study contains specific propositions, the more it will stay within reasonable limits” (cited in Bell 2010, p.8). Hitchcock and Hughes (Cohen et al 2000, p.181) claim that when the researcher does not have much control over events, case studies are especially beneficial.

Case studies involve the observation of characteristics of a subject: a person, a group, a class or a community. It is hoped to establish generalities about the wider group to which the subject belongs. Researchers have identified many types of case study. The case study approach has many advantages and constraints.

Advantages of a case study

The use of a case study as a research tool has many advantages. Bensbat et al 1987, (cited in Gable 1994, p.3) state the following benefits:

- The researcher can study in a natural setting and generate theories from practice
- The method allows the researcher to understand the nature and complexity of the process taking place
- Valuable insights can be gained into new topics emerging

Furthermore, case studies afford the use of direct and probing questions “to capture the richness of organizational behaviour” (Gable 1994, p.3).
**Disadvantages of a case study**
Nisbet and Watt (Cohen et al. 2000) address potential weaknesses of case studies:

- Authentication is not easy, therefore bias and subjectivism may manifest
- Observer preconception is an issue, even though efforts are made to combat this
- Generalisations can only occur when other researchers accept the case study’s claim

Gable (1994) suggests that conclusions may be unique to an organisation and generalisations may not be possible.

### 3.5 Fundamentals of Quantitative and Qualitative Research

Research methods can either be quantitative or qualitative.

**Quantitative research**
Quantitative research is the more traditional form of research. Quantitative research is also known as the positivist, empiricist or experimental research approach (Cottrell and McKenzie 2011, p.3). It uses numbers, which are measurable variables. Statistics are used to define relationships between the variables. The following advantages and disadvantages are outlined by Cottrell and McKenzie (pp.3-8).

**Advantages of quantitative research**
- Useful for studying large numbers of people
- Data analysis is less time consuming than qualitative research
- Precise quantitative data provided

**Disadvantages of quantitative research**
- This method may not be suitable for studying smaller groups of people
- Opponents to this method deem quantitative research as a manipulation of numbers

**Qualitative research**
Qualitative research involves answering questions about “the complex nature of phenomena with the purpose of describing, explaining and understanding the phenomena being researched” (Cottrell and McKenzie 2011, p.3). Words and phrases are recorded, as opposed to the numbers and statistics of quantitative research. Qualitative research is also known as constructivist, post-positivist and interpretative.
Interviews, case studies, ethnographic studies and observational research are qualitative.

Categories or variables emerge from the word data and qualitative researchers use interpretative narratives to explain the phenomenon being studied.

(Leedy & Ormond 2010, cited in Cottrell and McKenzie, p.4)

Advantages of qualitative research
- Qualitative research is beneficial for studying small numbers of people
- This form of research focuses on “depth rather than breadth” (Adler et al 1995, p.880)
- It is not influenced by outdated ideals or hypotheses (Adler et al 1995, p.880)

Disadvantages of qualitative research
Kerlinger (Gable 1994, p.3) identifies the following constraints of qualitative research:
- Independent variables cannot be manipulated
- The possibility of incorrect interpretation occurring
- The inability to randomize
- Data analysis is often time consuming
- Results may be biased by the researcher’s viewpoint

Mixed method research
While quantitative purists and qualitative purists deem their model superior to the other, they also believe that both are incompatible. The leading qualitative purist, Guba, advises that “accommodation between paradigms is impossible…we are led to vastly diverse, disparate, and totally antithetical ends” (Guba, cited in Johnson and Onzwuegbuzie 2004, p.14).
Kraemer identifies that while surveys were very useful in data generation, they were “greatly improved when used in conjunction with other qualitative research methods” (Gable 1994, p.1). Most modern research uses a synergy of qualitative and quantitative research (Cottrell and McKenzie 2011, p.8). When qualitative and quantitative methods are used in the same research, to provide a greater understanding of the research question, this gives rise to a mixed method research. Mixed method research can “help bridge the schism between quantitative and qualitative research” (Johnson and Onzwuegbuzie 2004, p.15).

**Sampling**

Cohen *et al* suggest that researchers may obtain their data from a subset of the total population (2000, p.94). This subset is known as a sample. Sampling is a central issue in research. Krejcie and Morgan (1970) in Cohen *et al* 2000 devised a formula for determining the sample size. It recommends that for a population size of twenty students, a sample size of nineteen students be used.

### 3.6 Data collection tools

In order to use mixed-method research effectively, researchers need to consider the strengths and weaknesses of the respective research methods. Once the research questions are established, the following data collection tools were considered.

<table>
<thead>
<tr>
<th>Answers Sought</th>
<th>Data Collection Tools Used</th>
</tr>
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<tbody>
<tr>
<td>How effective is Moodle in the learning of second-level French?</td>
<td>1. Test Results</td>
</tr>
<tr>
<td></td>
<td>1. Moodle activity report</td>
</tr>
<tr>
<td></td>
<td>2. Interviews</td>
</tr>
<tr>
<td>How effective are mobile devices in the learning of second-level French?</td>
<td>1. Questionnaire</td>
</tr>
<tr>
<td></td>
<td>2. Interview</td>
</tr>
<tr>
<td>How students actively use Moodle and what factors influence their usage?</td>
<td>1. Questionnaire</td>
</tr>
<tr>
<td></td>
<td>2. Moodle activity report</td>
</tr>
<tr>
<td></td>
<td>3. Interview</td>
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</table>

**Table 3.1: Data collection tools used**

**Questionnaire**

The students completed the questionnaire online. The researcher decided this was more suitable than a paper-based questionnaire due to the nature of the research, online
learning. The following factors influenced the researcher’s decision to use an online questionnaire as being the research tool most appropriate to the topic being investigated:

1. Less time consuming
2. Respondent anonymity
3. Cost reduction
4. Reduction of time taken to distribute, gather and process the data (Cohen et al. 2007, pp.229-230)
   The purpose of the questionnaire was to find answers to the key research questions. The questionnaire focused on the key research questions. The questions asked were designed to find out how students access the Internet and their motivations for doing so.

According to Cohen et al. (2000, p.247), the questionnaire should:

- Have clear purposes
- Be clear on what needs to be included in the questionnaire in order to answer the key questions
- Ask the most appropriate kinds of question
- Elicit the most appropriate kinds of data to answer the research purposes and sub-questions

**Limitations of a questionnaire**

Munn and Drever (1990, p.13) suggest two disadvantages of using questionnaires: the information collected tends to describe rather than explain why things are the way they are and that the information collected can be superficial. Similarly, Gable (1994, p.3) found that questionnaires only provide a “snapshot” of a moment in time and do not provide an explanation for the data collected.

**Semi-structured questionnaire**

A semi-structured questionnaire allows a respondent respond to, answer or comment how they deem best. While there is structure, answers are open-ended allowing the respondent to answer how he/she pleases.
The researcher chose to employ a structured questionnaire as they allow for speedy analysis of responses. The free online questionnaire generator *Survey Monkey* was chosen to administer the class questionnaire. Questionnaires can include closed, dichotomous questions, open-ended questions, multiple-choice and rating scales. However, this free version of *Survey Monkey* does not permit the asking of dichotomous questions.

**Closed questions**
Closed questions are completed quickly and easily coded. Closed questions are also “easy to quantify” and “follow a positivistic approach” (Opie 2004, p.106).

**Open questions**
Open-ended questions are very appealing for research on a small scale; and for parts of a questionnaire requiring personal and truthful comments. It is the open-ended questions that “contain the gems of information that otherwise might not have been caught in the questionnaire” (Cohen *et al* 2000, p.255). They also believe that open-ended questions capture the “authenticity, richness, depth of response, honesty and candour.”

Open questions allow respondents to reply in their own words and to justify their answers. Making comparisons between respondents may not be easy with open-ended questions. Open questions are also challenging to code. Cohen *et al* 2000, (p.249), recommend avoiding too many open-ended questions in questionnaires, as respondents cannot be queried about what exactly they mean. Furthermore, open-ended questions are deemed too time-consuming for respondents (Cohen *et al* 2000, p.249).

The researcher chose closed questions as this level of *Survey Monkey* did not permit open questions. Open questions were used in the interview.

**Multiple-choice questions**
In the question design stage, consideration was given to no overlap of questions. Multiple-choice questions are coded easily. In this research, where Internet access and Internet activity were investigated, multiple-choice questions were deemed a useful instrument. Ambiguity was avoided by choosing words carefully.
Multiple-choice questions were used to investigate whether the students use 3G or fixed-line broadband (Appendix D, Question Five and Question Six).

**Ranking**
While similar to the multiple-choice question, where respondents can choose options; respondents are asked to prioritise. Rankings are beneficial as they indicate level of preference. Wilson and McLean propose that it is not realistic to request respondents to prioritise more than five ranks (Cohen et al 2000, p.252). This was taken into consideration in Question Eight (Appendix D). However, due to the vast array of Internet activities in Question Seven, nine activities were included for ranking. The researcher chose ranking in order to establish students’ preferred online activities. This was done to establish student preferences, which would be included in the website design.

**Student questionnaire**
A background questionnaire was devised to assess students’ Internet activities and their methods of Internet access (Appendix D). Clarity of instructions and wording were paramount.

**Piloting**
Piloting should be undertaken to “increase the reliability, validity and practicability of the questionnaire” (Oppenheim 1992; Morrison 1993; Wilson and McLean 1994: 47 cited in Cohen et al 2000, p.260). Munn and Drever (1990, p.32) recommend giving the questionnaire “in its original version to two or three people.” On 23rd January 2013, this questionnaire survey was piloted on two First Year students from another class. After piloting the questionnaire (Appendix C), adjustments were made to its wording to “remove ambiguous and misleading phrases” (Munn and Drever 1990, p.40). Any issues arising were amended. The online questionnaire was limited to 10 questions. After the piloting, an additional instruction “Put a tick” was included. The following amendments were made:
### Table 3.2: Changes after piloting of Questionnaire

<table>
<thead>
<tr>
<th><strong>Pilot questionnaire</strong></th>
<th><strong>Final questionnaire</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3</td>
<td>Q4: Desktop in school or at home, laptop at home specified.</td>
</tr>
<tr>
<td>Q5</td>
<td>Q6: Wi-Fi, 3G or both specified.</td>
</tr>
<tr>
<td>Q1</td>
<td>Now separated into Q1 and Q2.</td>
</tr>
<tr>
<td>Q2</td>
<td>Increment changed from 2-10 minutes to 1-10 minutes in Q3.</td>
</tr>
<tr>
<td>Q6</td>
<td>Q5: Survey Monkey’s compulsory element was removed in settings after piloting. (Student 1 answered this question in piloting stage, even though he has not tablet).</td>
</tr>
<tr>
<td>Q8</td>
<td>Q8: Compulsory element removed after piloting. (Student 2 only had 3 favourite websites in the piloting stage).</td>
</tr>
</tbody>
</table>

**Sequence of questions**

Initial questions were simple and unthreatening, for example, age, gender. Questioning was then moved to multiple-choice questions and ranking scales. The researcher considered including open questions, but the online survey generator Survey Monkey only provides this option at a cost. Funnelling questions were not available at this free level of Survey Monkey.

The students completed this survey (Appendix D) on 30\(^{th}\) January 2013, in the pre-intervention phase, in a computer room at school, once Parental Consent forms were completed. Guidance and instructions were given to students during completion of online questionnaire. Nine questions were asked: six multiple choice questions, two rating scales and finally, a listing question.

**Testing**

Tests are classified as parametric or non-parametric (Cohen et al 2000). Parametric tests are carried out on large groups of the population. Parametric tests are often published as standardised tests. Suppositions are made about the distribution of scores in the population. Continuous and equal intervals exist between scores. Thus, a score of
60 per cent can be implied to be double that of 30 per cent. Parametric tests are more
dominant than non-parametric tests as they permit the researcher to make comparisons
with the whole population.

Non-parametric tests make no assumptions about the parameters of the population’s
scores. No comparison is made with the wider population. These tests are designed for
a particular population, for example, of a class in a school. As no assumptions are
made of how normal and regular the score distribution will be, non-parametric statistics
are especially attractive in small samples. Non-parametric tests are generally used by
teachers in the classroom. Non-parametric statistics are easier calculated than
parametric statistics.

Tests can also be classified as norm-referenced or criterion referenced. Norm-
referenced tests compare students’ results relative to other students’ results. With
criterion referenced tests, students are required to meet predefined criteria or standards,
irrespective of how many others attained, or failed to attain the criteria. Criterion
referenced tests show what a student has learned, while the norm-referenced test only
show a student’s achievement relative to another’s result.

**Pre-testing**

All students were pre-tested in February 2013, prior to commencement of intervention
(access to Moodle), to establish students’ language accuracy (Appendix E).

**Method for testing language accuracy**

At the end of each week, students were tested on material taught in class that week. As
emphasis was on language accuracy, students were required to spell the word
corresponding to the image presented on the exam paper (Appendix F).

Prior to testing the students, the test was piloted by students in another school. Minor
errors were amended when required.

**Interviews**

Kvale describes interviews as “an interchange of views between two or more people on
a topic of mutual interest” (Cohen *et al* 2000, p.267). He continues by defining the
purpose of the qualitative research interview as:
To gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena.

(Kvale 1983, p.174 cited in Opdenakker 2006)

Oppenheim proposes that interviews are more successful than questionnaires because respondents are more involved and motivated (1992: 81 – 2 cited in Cohen et al 2000, p.269).

Prior to administering this interview, it was piloted on First Year students from another school. On 19th March 2013, interviews were carried out to facilitate a qualitative investigation; aiming to get a deeper understanding of student motivation in using the ‘Moodle’ (Appendix G). Open-ended questions were asked which permitted respondents to freely say what they wanted. These questions are harder to quantify and to code.

**Researcher’s Notes**

The researcher maintained a list of notes on observations on issues that arose during implementation of Moodle. When students reported issues these were documented. Observations and trends were also noted.

**Moodle Activity Report**

Student online Moodle data was available to the researcher. It was also possible to observe students’ revision practices and online activities (Appendix I). Login accounts and content were managed by the researcher. The researcher monitored student online activity. Detail of individual student’s online activity was also available (Appendix J).
3.7 Data analysis considerations

Validity

Validity is an important element of research. It asks if the research measured what it intended to measure. While validity is required for both qualitative and quantitative research; it is of paramount importance in quantitative research. In quantitative research, validity may be increased with prudent sampling and correct statistical treatment of the data. Despite the potential subjectivity and bias of respondents in qualitative research, validity should address the honesty and wealth of data. Research cannot be totally perfect. Consequently, Grounlund advises that in research, validity “should be seen as a matter of degree, rather than an absolute state” (cited in Cohen et al 2000, p.105). Internal and external validity is associated with both qualitative and quantitative methods of research. Internal validity is the extent to which to which a conclusion arising from a study is justified. External validity concerns the validity of results from a study being generalised to other people or other situations.
Reliability
Reliability concerns producing consistent results. In quantitative research, the Pearson coefficient measures stability over a sample, for example, two groups of similar students tested simultaneously. In qualitative research, contention exists concerning reliability. Nevertheless, Denzin and Lincoln (1994) recommend reliability be addressed through “stability of observations” and “inter-rater reliability” (Cohen et al 2000, p.119).

Triangulation
Cohen et al (2000) define triangulation as “the use of two or more methods of data collection in the study of some aspect of human behaviour” (p.112). In a triangulation mixed method design, quantitative and qualitative data are gathered simultaneously, to draw conclusions on the research question. In this study, quantitative data from the pre-intervention and post-intervention tests was used, along with data from student questionnaires and Moodle activity report. Qualitative data from post-intervention interviews was also included. Additionally, ‘the researcher’s notes were also included in the investigation.

As triangulation encompasses many methods of data collection; likewise many types of triangulation exist. ‘Within Methods’ and ‘Between Methods’ are two categories of methodological triangulation. According to Denzin, ‘Within Methods’ (Bryman, p.3) involves using the same method to reach a conclusion; for example, a questionnaire using different scale to measure a question. ‘Between Methods’ triangulation involves the use of contrasting research methods; for example, a questionnaire and an interview. While ‘Between Methods’ may refer to mixed method design, the term is best used when it is used to check the validity of the findings.

This study uses ‘Between Methods’ of research. The quantitative and qualitative data collection tools used, determine this choice. Pre-intervention and post-intervention testing, a questionnaire and interviews were utilised. The results of these facilitate triangulation and increase this case study’s reliability and validity.
Through the use of multiple methods the robustness of results can be increased; findings can be strengthened through the cross-validation achieved when different kinds and sources of data converge and are found to be congruent or when an explanation is developed to account for divergence.  

(Kaplan and Duchon 1988, cited in Gable 1994, p.5)

**Processing data: Coding**

Coding is the chief method of data reduction. Kerlinger describes coding as “the translation of question responses and respondent information to specific categories for the purpose of analysis” (Kerlinger 1970, cited in Cohen et al 2000, p.283).

**Questionnaire coding**

A code number is given to every answer to a question in a questionnaire. Precoding occurs during the design of the questionnaire. It is possible to precode closed questions. However, many open-ended questions cannot be reduced to code numbers. For open-ended questions, postcoding occurs after the questionnaire is completed.

1. Colour coding
2. Grid placement
3. Inferential coding
4. Researcher’s remarks

**Interview coding**

Once the interview is completed, the data is coded or scored. With qualitative data, data analysis is generally interpretative. Analysis involves creating meaning, classifying and ranking these units of meaning, establishing narratives to describe occurrences and finally, the interpretation of the data (Cohen et al 2000, p.282).

### 3.8 Ethics

Moral issues are fundamental in social research. Respect must be shown to those taking part in, or affected by, their research. Describing ethics, Cavan states that “while truth is good, respect for human dignity is better” (Cohen et al 2000, p.56). In this regard, Sieber concurs with Cavan by adding that ethics involves

The application of moral principles to prevent harming or wronging others, to promote the good, to be respectful and to be fair.
In this research, ethical procedures involved gaining permission from school management and from parents to conduct the research. The research study was explained to participants and their full co-operation was achieved for the duration of the research.

**Informed consent**

Most research requires the permission and co-operation of participants. Participants should know that their involvement is voluntary at all times, and they should receive a thorough explanation beforehand of the benefits, rights, risks and dangers involved as a consequence of their participation in the research project.


As the participants were aged between twelve and fourteen years of age, parental consent was sought (Appendix A). The researcher fully explained the research to the participants. Participants were not put at risk. Their anonymity was respected.

Parents were advised in the letter that if their child felt uncomfortable with the study, he could withdraw from the study at any time.

**The costs/benefits ratio**

This dilemma exists in social research. Researchers must consider the possible social benefits of the research against the costs to the participants. Opie recommends that researchers

Think about what they can give back, about what’s ‘in it’ for their informants and seek to find some sort of reciprocity

*(Opie 2004, p.29)*

Benefits include greater understanding of the research area and a satisfaction in having contributed to social science. In the letters seeking parental consent, parents were assured by the researcher that “participation in this study will only enhance their child’s learning of French.”

**Access and acceptance**

Bell (1987) recommends seeking written authorisation from institution management in the early stages of research. The researcher’s course of study is to be indicated. He continues by advocating highlighting any potential benefits of the research *(Cohen et al 2000, pp.53-54)* (Appendix A).
Anonymity, confidentiality and privacy
Anonymity was paramount in this research. The letter of parental consent explained to parents that “no student or the school will be identified at any stage” (Appendix A). It also explained to the parents that “the data and information collected will only be accessible to my tutor and me.”

3.9 Timeline of Data Collection

<table>
<thead>
<tr>
<th>Parental permission received</th>
<th>Pre-intervention test</th>
<th>Moodle activity reports</th>
<th>Moodle activity reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permission received from school management to carry out research</td>
<td>Piloting of questionnaire</td>
<td>Post-intervention tests</td>
<td>Post-intervention tests.</td>
</tr>
<tr>
<td>Researcher’s notes</td>
<td>Administration of questionnaire</td>
<td>Researcher’s notes</td>
<td>Researcher’s notes.</td>
</tr>
<tr>
<td>Feb 2013</td>
<td>Mar 2013</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.2: Timeline of Data Collection

3.10 Conclusion

This chapter has outlined the research approach and methodologies engaged in this study. This study is a case study and will use both qualitative and quantitative methods of data collection.
Chapter Four - Findings

4.1 Introduction

This case study aims to investigate the effectiveness of using Moodle to compliment the teaching of First Year French. The class was divided into two groups based on access to Internet at home and past exam results. Group A revised at home using Moodle and textbook. Students in Group A accessed the learning activities and assessments through mobile devices (laptops, tablets and smartphones) and their textbook. Group B revised solely using their textbook. This chapter outlines the findings of this case study. The chapter relating to ‘Les Animaux’ was taught in class, developing students’ aural, oral, reading and written skills. The textbook, researcher’s desktop computer, visualizer and data projector were the primary resources used in class. Homework from the textbook was assigned each night to all students.

The researcher made every effort to continue teaching as normal. Students were not briefed on the aims of the study undertaken. Students from Group A sat beside students from Group B. No distinction was made between the two groups of students in class as this might affect student performance. This was to reduce the positive influence of the Hawthorne Effect whereby students perform more positively when they know they are being assessed.

Data collected in the research process is presented in this chapter. Data collection tools used consisted of an online questionnaire (Appendix D), class tests (Appendices E and F), interviews (Appendices G and H) and Moodle’s activity reports (Appendix I). Both the questionnaire and test results were analysed using quantitative research analysis. Interview responses were analysed, using both quantitative and qualitative research analysis methods to observe patterns of behaviour, motivation and practices associated with the use of Moodle in the learning of French. Finally, Moodle’s activity reports were analysed and assessed to determine the correlation between online activity and results. Triangulation was used in an effort to increase the research’s validity and reliability.
This section presents the findings of research in relation to each research question. The results of this investigation are presented in three sections, corresponding to the research questions posed in Chapter Three.

- Section 4.2 examines the effectiveness of Moodle in the learning of second-level French
- Section 4.3 investigates the effectiveness of mobile devices in the learning of second-level French
- Section 4.4 documents how students use Moodle and the factors influencing such usage

The participants

The participants of this study were First Year students of French in a secondary school in the northwest of Ireland. This class was mixed ability and mixed gender. The participants completed the online questionnaire using Survey Monkey (Appendix D). The class was then divided into two groups (Group A and Group B) based on previous exam results, a pre-test and access to Internet at home. Each group consisted of pupils of mixed ability and gender. During a four week period in February and March 2013, Group A used Moodle and their textbook to study a topic in French; whereas Group B used their textbook only. All students underwent language testing. Group A students participated in post-intervention interviews to evaluate student perception and opinion on the advantages and limitations of Moodle in relation to their learning and motivation.
The demographics of the students

Students were asked to list their age in Question 1 of the questionnaire. The students who participated in the questionnaire were predominantly female, Figure 4.1 above. 71.43 per cent (15) females and 28.57 per cent (6) male students completed the questionnaire. Twenty-one students completed the questionnaire and twenty students completed the research activity as one student left the school.

The students were aged between twelve and fourteen years of age, Figure 4.2 above. The age profiles of the students were as follows: 33.33 per cent (7) were twelve years
of age. 61.90 per cent (13) were thirteen years of age and finally, 4.76 per cent (1) were fourteen years of age.

4.2: How effective is Moodle in the learning of second-level French?

Introduction

Moodle was chosen as the research tool because it is free open source software (OSS). Open source means that users have access to the source code of the software. Moodle can be installed on any computer capable of running PHP. PHP is the scripting language integrated with the web server. It is user-friendly from a researcher and student standpoint. A knowledgeable online community is available to collaborate, communicate and advise anytime and anywhere. This is aligned with the beliefs of constructivism. It has high levels of security, great flexibility and an array of capabilities and tools. While other Content Management Systems (CMS) are tool-centred, Moodle is learning-centred. Updates and plug-ins are reliable.

Development of Moodle

The researcher discovered the ‘MoodleBook’ interface, which she thought would appeal to her students. Students were asked to choose their favourite Moodle interface described below: Web host FreeMoodle’s theme (Figure 4.3a) or Gnomio’s ‘Moodlebook’ theme (Figure 4.3b).
Students unanimously chose Gnomio’s ‘Moodlebook’ theme, which has a similar look and feel to Facebook. This theme provided ease of use and familiarity as its navigation was very similar to Facebook’s.

The above themes were shortlisted by the researcher from a list of potential themes shown in Appendix K.

Following the selection ballot, the researcher developed the Moodle website www.frenchzone.gnomio.com (Figure 4.3b). The researcher then created individual usernames and passwords and these were given to each student in Group A to access Moodle. The researcher demonstrated the log-in process using a data projector to all students. This was done to reduce the Hawthorne Effect, whereby Group A students may performed better due to increased attention from the researcher. It was also demonstrated to all have students, to ensure Group B students would also know how to log on, when they would have access to Moodle in the post-intervention period.

With the aim of answering this research question, the following research tools were used:

1. Test Results
2. Moodle activity report
3. Interviews

1. Test Results

<table>
<thead>
<tr>
<th></th>
<th>A pretest %</th>
<th>test1</th>
<th>test2</th>
<th>test3</th>
<th>Average tests 1,2,3</th>
<th>Final test%</th>
<th>Average of 4 tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>100.0</td>
<td>90.0</td>
<td>100.0</td>
<td>80.0</td>
<td>90.0</td>
<td>80.0</td>
<td>87.5</td>
</tr>
<tr>
<td>F1</td>
<td>90.0</td>
<td>90.0</td>
<td>80.0</td>
<td>80.0</td>
<td>83.3</td>
<td>84.0</td>
<td>83.5</td>
</tr>
<tr>
<td>F2</td>
<td>60.0</td>
<td>60.0</td>
<td>60.0</td>
<td>20.0</td>
<td>46.7</td>
<td>52.0</td>
<td>48.0</td>
</tr>
<tr>
<td>F3</td>
<td>60.0</td>
<td>60.0</td>
<td>100.0</td>
<td>90.0</td>
<td>83.3</td>
<td>80.0</td>
<td>82.5</td>
</tr>
<tr>
<td>F4</td>
<td>60.0</td>
<td>80.0</td>
<td>40.0</td>
<td>80.0</td>
<td>66.7</td>
<td>80.0</td>
<td>70.0</td>
</tr>
<tr>
<td>F5</td>
<td>50.0</td>
<td>60.0</td>
<td>90.0</td>
<td>75.0</td>
<td>64.0</td>
<td>71.3</td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>50.0</td>
<td>50.0</td>
<td>90.0</td>
<td>76.7</td>
<td>56.0</td>
<td>71.5</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>40.0</td>
<td>80.0</td>
<td>40.0</td>
<td>90.0</td>
<td>70.0</td>
<td>72.0</td>
<td>70.5</td>
</tr>
<tr>
<td>F7</td>
<td>40.0</td>
<td>30.0</td>
<td>30.0</td>
<td>70.0</td>
<td>43.3</td>
<td>52.0</td>
<td>45.5</td>
</tr>
<tr>
<td>F8</td>
<td>20.0</td>
<td>40.0</td>
<td>20.0</td>
<td>40.0</td>
<td>33.3</td>
<td>36.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Average</td>
<td>57.0</td>
<td>68.9</td>
<td>58.0</td>
<td>73.0</td>
<td>66.8</td>
<td>65.6</td>
<td>66.4</td>
</tr>
</tbody>
</table>

Table 4.1a: Group A

<table>
<thead>
<tr>
<th></th>
<th>B pretest %</th>
<th>test1</th>
<th>test2</th>
<th>test3</th>
<th>Average tests 1,2,3</th>
<th>Final test%</th>
<th>Average of 4 tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>F8</td>
<td>100.0</td>
<td>90.0</td>
<td>70.0</td>
<td>70.0</td>
<td>76.7</td>
<td>72.0</td>
<td>75.5</td>
</tr>
<tr>
<td>F9</td>
<td>100.0</td>
<td>40.0</td>
<td>30.0</td>
<td>50.0</td>
<td>40.0</td>
<td>80.0</td>
<td>50.0</td>
</tr>
<tr>
<td>M3</td>
<td>90.0</td>
<td>60.0</td>
<td>60.0</td>
<td>100.0</td>
<td>73.3</td>
<td>84.0</td>
<td>76.0</td>
</tr>
<tr>
<td>F10</td>
<td>70.0</td>
<td>70.0</td>
<td>40.0</td>
<td>80.0</td>
<td>80.0</td>
<td>76.0</td>
<td>78.0</td>
</tr>
<tr>
<td>F11</td>
<td>70.0</td>
<td>70.0</td>
<td>40.0</td>
<td>80.0</td>
<td>80.0</td>
<td>76.0</td>
<td>78.0</td>
</tr>
<tr>
<td>F12</td>
<td>60.0</td>
<td>10.0</td>
<td>10.0</td>
<td>40.0</td>
<td>20.0</td>
<td>24.0</td>
<td>21.0</td>
</tr>
<tr>
<td>F13</td>
<td>60.0</td>
<td>70.0</td>
<td>20.0</td>
<td>40.0</td>
<td>43.3</td>
<td>40.0</td>
<td>42.5</td>
</tr>
<tr>
<td>F14</td>
<td>40.0</td>
<td>40.0</td>
<td>10.0</td>
<td>70.0</td>
<td>40.0</td>
<td>48.0</td>
<td>44.0</td>
</tr>
<tr>
<td>M4</td>
<td>40.0</td>
<td>40.0</td>
<td>10.0</td>
<td>70.0</td>
<td>40.0</td>
<td>32.0</td>
<td>38.0</td>
</tr>
<tr>
<td>M5</td>
<td>30.0</td>
<td>50.0</td>
<td>20.0</td>
<td>35.0</td>
<td>52.0</td>
<td>40.7</td>
<td></td>
</tr>
<tr>
<td>M6</td>
<td>20.0</td>
<td>20.0</td>
<td>10.0</td>
<td>20.0</td>
<td>20.0</td>
<td>16.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Average</td>
<td>61.8</td>
<td>50.0</td>
<td>28.8</td>
<td>56.0</td>
<td>47.6</td>
<td>51.6</td>
<td>48.7</td>
</tr>
</tbody>
</table>

Table 4.1b: Group B

Tables 4.1a and 4.1b present the results of class tests during the trial period. To protect students’ identities, male students are identified as M and female students are identified as F. The learning which occurred can be inferred by comparing the results achieved by
those students using Moodle and textbook (Table 4.1a), with the scores of the traditional paper-based group (Table 4.1b).

A paper-based vocabulary pre-test was given to all students before Group A was introduced to Moodle (Appendix F). This pre-test assessed students’ vocabulary about fruit and vegetables. The results of this showed that Group B outperformed Group A. Group A had an average score of 57 per cent, whereas Group B scored 69 per cent.

The formal testing to measure the effectiveness of using Moodle to compliment the researcher’s classroom activities followed. Students had four class periods of French, lasting thirty-five minutes, per week. Each topic was taught during three class periods and tested in the fourth class, which was on a Thursday.

To reduce the influence of the Hawthorne Effect, all students were given a paper-based test each Thursday, at the end of each topic.

Test 1 (Appendix G) tested vocabulary on topic of ‘Les Animaux Domestiques’. Group A, who used Moodle and textbook, scored 68.9 per cent; while Group B, who used traditional paper-based learning, scored an average of 50 per cent.

Test 2 (Appendix G) examined vocabulary on topic of ‘Les Animaux à la Ferme’. Group A attained a score of 58 per cent; whereas Group B recorded a score of 28.8 per cent.

Test 3 (Appendix G) dealt with vocabulary relating to topic of ‘Les Animaux au Zoo’. Group A recorded an average score of 73 per cent; while Group B achieved an average score of 56 per cent. Group A outscored Group B in all 3 tests.

In tests 1, 2 and 3, Group A attained an average of 66.8 per cent; however, Group B scored 47.6 per cent on average.

Test 4 was a cumulative test revising all three topics: pets, farm animals and zoo animals. Group A achieved an average of 65.6 per cent; whilst Group B achieved 51.6 per cent on average.

Group A scored 66.4 per cent on average in their four tests. They scored 57 per cent in the pre-intervention test, recording a 9.4 per cent increase in performance. Group B scored 48.7 per cent on average in their four tests. They recorded a score of 61.8 per
cent in the pre-test. Group B had an average decrease of 13.1 per cent following the intervention.

Figure 4.4a: Average performance over the four tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Pre-Test</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Final Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A - Moodle Group</td>
<td>57.0</td>
<td>68.9</td>
<td>58.0</td>
<td>73.0</td>
<td>65.6</td>
</tr>
<tr>
<td>Group B - Traditional</td>
<td>61.8</td>
<td>50.0</td>
<td>28.8</td>
<td>56.0</td>
<td>51.6</td>
</tr>
</tbody>
</table>

Figure 4.4b: Pre-intervention versus post-intervention results

Group A scored lower than Group B in the pre-test. Group B scored 48.7 per cent on average in the four tests, while Group A scored 66.4 per cent on average in the four
tests (Figure 4.4a). Group A’s consistently better results in Tests 1, 2, 3 and 4 are evident in Figure 4.4b.
2. Moodle activity reports

In order to triangulate the data, Moodle’s activity reports were analysed in addition to the quantitative data acquired through test results. Moodle activity reports show student logon times and last-access times. As the students knew that their online activity was being monitored, did this have an influence on their performance? Did the Hawthorne Effect occur in this case? The activity reports recorded a high level of activity before the weekly tests. Games recorded high levels of activity.

![Figure 4.5: Example of a student’s online activity](image)

Figure 4.5 above shows an example of student online activity. The score and attempts are available in Moodle activity reports. The IP address is visible. This student attempted the game ‘Hangman’ 179 times. 81 attempts were made between 3.19pm on March 4th and 8.19pm on March 5th 2013. The first session produced a score of 88. The following session occurred between 8.19pm on March 5th 2013 and concluded at 8.36pm on March 9th. 78 attempts were made and this session yielded a score of 100. The final session occurred between 6.56pm on March 11th and 7.12 pm March 14th. 20 attempts were made and a score of 100 was realised.
Figure 4.6: Example of a student’s online activity

Figure 4.6 above illustrates another student’s online activity. On Wednesday 20 February, this student achieved scores of 0, 25, 0, 21, 56, 0, 75 and 100 in a game.
3. Interviews
In Question 4 of the interview, the researcher sought answers to the question: “Did you spend more time doing French while you had access to Moodle?”

![Figure 4.7: Time doing French while students had access to Moodle](image)

As Figure 4.7 highlights, students were united in their replies, 100 per cent of students stated that they spent more time doing French while they had access to Moodle.

In Question 13 of the interview, students were asked if they thought it was useful to have access to Moodle for learning French. Students unanimously perceived that it was beneficial to have access to Moodle for learning French. F1 believed that Moodle was “a great way of learning French and portable as well, so you could bring it anywhere anytime”.

Fun was another benefit of Moodle. According to F4 “It was a better way of learning. It was fun. It was easy.” M2 agreed by adding “It’s an easier way to learn. It’s more fun.”

Usefulness was a further advantage of Moodle. F8 commented that “if you were looking at it, if you didn’t like study it would still be a help with the spellings”. F2 reiterated the usefulness by saying “it was handy when you had to study for a test. It made the spellings easier.”

Students found the instant feedback useful because they could re-take the test and revise the vocabulary again. With a standard paper-based test, the momentum was lost by the time delay in getting feedback. Students commented positively on the feedback
given. F3 reported that “it told you what you got. It was really good.” M1 also found the feedback useful “It gave good feedback as well.”

Question 9 of the interview investigated whether students would prefer homework on Moodle or from the textbook.

The popularity of Moodle was evident in student replies. 100 per cent of students chose Moodle as their preferred method of completing homework (Figure 4.8).

The Student Suggestions for Future Moodle Learning Sites indicated various recommendations for improvement. These included making it easier to submit assessments, including more games, and having more features. Some links were also noted to need the Adobe player. Time zones were not consistent, and there was no recommendation overall.

Figure 4.8: Moodle or the textbook

Figure 4.9: Student suggestions for future Moodle sites
Question 12 of the interview sought responses to the question “Have you any recommendations for Moodle in the future?” (Figure 4.9). Three students recommended that the submission be made easier. F4 suggested the researcher “make the submission a bit easier.”

A further three students recommended more games be added to Moodle. M1 recommended that the researcher “put a few more games on Moodle.”

**Conclusion**
The test results prove that Moodle is effective in the learning of second-level French. The students’ use of Moodle is effective in motivating them to revise through games. This occurs through instant feedback and scores. Interview results show that Moodle is effective in the learning of second-level French. Overall, students perceived that Moodle helped them learn French.

### 4.3: How effective are mobile devices in the learning of second-level French?

**Introduction**

In order to investigate student motivation to learn when using mobile devices, the following research tools were used:

1. Questionnaire
2. Interviews

**1. Questionnaire**

Question 4 of the questionnaire asked students to list the devices they used for Internet connectivity.
Figure 4.10: Breakdown of devices used to connect to the Internet

Figure 4.10 gives a breakdown of answers given. 85.71 per cent of students (18) used a laptop. 66.67 per cent of students (14) used a smartphone. 42.86 per cent (9) used a desktop computer at home; while a further 33.33 per cent of students surveyed used a tablet for Internet access. These percentages total more than 100 per cent indicating that students use a variety of devices to access the Internet.

Question 5 of the questionnaire asked students to list the types of Internet connection they have at home.

Figure 4.11: Types of Internet connection at home
This was asked to find out who had Internet at home, and its type. 90 per cent of students (18) had broadband. Only one student had 3G; while another student stated he had no broadband access at home. See Figure 4.11 above.

Question 6 of the questionnaire asked students to state the type of Internet connection used while using mobile devices e.g. wireless or 3G.

<table>
<thead>
<tr>
<th>Uses</th>
<th>Response Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G</td>
<td>6.3%</td>
<td>1</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>81.3%</td>
<td>13</td>
</tr>
<tr>
<td>Both</td>
<td>25.0%</td>
<td>4</td>
</tr>
</tbody>
</table>

*Figure 4.12: Types of Internet connection using mobile devices*

This question was asked to determine the level of 3G usage. 81.25 per cent of students (13) depended on Wi-Fi. 25 per cent of students (4) used 3G and Wi-Fi, while one student used 3G only. See Figure 4.12 above.

Question 3 of the questionnaire was used to determine the time spent each day commuting to school each morning.

<table>
<thead>
<tr>
<th>Time</th>
<th>Response Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 10 minutes</td>
<td>47.6%</td>
<td>10</td>
</tr>
<tr>
<td>11 - 20 minutes</td>
<td>28.6%</td>
<td>6</td>
</tr>
<tr>
<td>21 - 30 minutes</td>
<td>9.5%</td>
<td>2</td>
</tr>
<tr>
<td>31 - 40 minutes</td>
<td>4.0%</td>
<td>1</td>
</tr>
<tr>
<td>41 - 60 minutes</td>
<td>4.0%</td>
<td>1</td>
</tr>
<tr>
<td>More</td>
<td>4.0%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Figure 3.2: Time spent commuting to school each morning*
Six students spend between eleven and twenty minutes, commuting to school each day. This totals to a minimum commute, to and from school, of twenty-two minutes per day. These students spend from one hundred and ten minutes to two hundred minutes per week in a car or bus en route to school.

Two students spend between twenty-one and thirty minutes commuting to school each day. These students spend from two hundred and ten minutes to three hundred minutes per week commuting to school.

One student’s journey to school lasts between thirty-one and forty minutes. This student’s commute to school ranges from three hundred and ten minutes to four hundred minutes per week.

An additional student’s journey to school lasts between forty-one and fifty minutes. This totals to a commute time of between four hundred and ten minutes to five hundred minutes weekly.

To finish, another student’s journey to school is more than fifty minutes. This student spends at least five hundred minutes per week commuting to school.

The results show a vast amount of student travel time that could be used more constructively while going to and from school. In the absence of affordable 3G, the provision of Wi-Fi on school buses could resolve this accessibility issue. Free Wi-Fi is available on Bus Éireann, Dublin Bus, Intercity coaches and on some other private coach companies.
2. **Interviews**
All ten students from Group A were interviewed after the Moodle intervention.

![How Group A accessed Moodle](image1)

**Figure 4.14: How Group A accessed Moodle**

In response to Question 1 of the interview “What device was used to access Moodle?” most students used more than one type of device for Internet access (Figure 4.14). Two desktop computers were used. Two smartphones, two iPod ‘Touch’, three tablets and eight laptops were used.

![How do you connect to Moodle at home?](image2)

**Figure 4.15: How students accessed Moodle**
Figure 4.15 displays how students accessed Moodle in Group A. Students used Wi-Fi on 15 occasions, whereas fixed broadband was only used twice. Three students stated they accessed it in their bedroom on their laptop. F4 reported that access was easy, “You were going to be on your laptop anyways, so you could just go onto Moodle.”

The popularity of mobile devices and Wi-Fi was clear.

![Bar chart showing that 100% of students liked using Moodle.](image)

**Figure 4.16: Did students like using Moodle?**

In response to Question 2 of the interview, “Did you like using Moodle?” 100 per cent of the students liked Moodle (Figure 4.16). The sheer novelty of not using a textbook was evident. As F8 reported “Just to use the laptop, it was something different. All the stuff was written and everything.” M1 had a similar experience “it was faster and funnier than the textbook. It was easier to just go on the laptop instead of taking out your textbook and looking at it.”

Portability was cited as an advantage. The fact Moodle could be accessed anytime anywhere proved advantageous. Students cited its accessibility as a positive aspect. Student F3 revealed that she accessed Moodle on her phone at her grandparents’ house.

**Conclusion**

The results of the questionnaire confirm that students are more motivated to learn using a mobile device for a number of reasons. Portability and mobility were positive aspects of mobile devices. The convenience of using a mobile device, as opposed to taking out the textbook was cited. The intrinsic motivation of using a mobile device as opposed to
a textbook was noted as an advantage. The majority of students accessed Moodle using Wi-Fi as opposed to fixed-line broadband.

4.4: How do students use Moodle and what factors influence their usage?

Introduction

Web 2.0 tools allow users to interact and collaborate in a virtual community to create user-generated content online.

Moodle provided:
1. Web 2.0 tools
2. Quizzes
3. Vocabulary games
4. Exam reinforcement

Moodle used the following Web 2.0 tools:
- Voki
- Xtranormal
- YouTube clips

Voki

Voki is a Web 2.0 tool for teaching, listening and speaking. Voki is a free online educational tool which allows users to create their own speaking avatar. An avatar is a graphical image that represents a person. Avatars can be customised with different looks, hairstyles and clothing. Students type in the script and have a choice to select a male or female voice and an accent.
Each weekend, Group A students completed an online Web 2.0 task. Figure 4.17 above shows the instructions for the Voki assignment.

Students applied their creativity to create customised Voki avatars. Figure 4.17b is an example of a student’s work.
Xtranormal

Xtranormal is a free Web 2.0 tool which immediately converts text into a 3D animated movie. Students were asked to create a movie describing farm animals. Students were given instructions on how to use Xtranormal.

Figure 4.18a: Example of a student’s creation

Figure 4.18b: Example of a student’s creation

Students unleashed their creativity by selecting backgrounds, camera angles, background music, facial expressions and gestures of characters. Figure 4.18a and Figure 4.18b (above) display such creativity.

YouTube clips

A YouTube clip was inserted onto the Moodle page using Moodle’s media function.
Students were asked to watch the short cartoon and to answer questions based on what they saw (Figure 4.19a).

Six students submitted this assignment (Figure 4.19b).
With the intention of answering the research question “how do students use Moodle?”, these research tools were used:

1. Questionnaire
2. Moodle activity report
3. Interview

1. **Questionnaire**

Before developing Moodle-based material, the researcher wanted to find out students’ preferred online activities, so that they may be included in Moodle.

![Figure 4.20: Average ranking of online activities](image)

A ranking question was used in this instance in Question 7 of the questionnaire. Figure 4.20 illustrates that overall, searching for information was the most popular online activity with an average ranking of 7.05 per cent. Social Networking was the second most popular online activity, with its average ranking of 6.48 per cent. On the other hand, however, news and education were the least favourite online activities. Education held an average ranking of 3.29 per cent; while news had an average ranking of 3.05 per cent.
In order to establish students’ favourite websites, in Question 8 of the questionnaire, students were asked to list their five favourite websites. Figure 4.21 displays students’ preferred websites. Twelve students preferred Facebook, five students preferred YouTube, while two students preferred Google.

Using ranking, in Question 9 of the questionnaire, students were asked to assess their favourite websites. This question was asked to assess students’ online interests and preferences. Use of colours and games included were the most popular features of a website (Figure 4.22).
2. Moodle activity reports

The researcher and students have the facility to send messages using Moodle. Students have the opportunity to see who else is online at the same time. The opportunity to send a message to another student is also possible. Figure 4.23 is an example of a student’s message to a classmate at 4.35 pm. As the student was aware of who else was online at that time, she received a reply at 4.36 pm from her classmate.

The ‘All logs’ option displays the hits on the website. As in Figure 4.24, this student accessed Moodle four hundred and ninety times on Tuesday 19 March 2013.
Figure 4.25 – How to access Outline Report

The ‘Outline Report’ option details hits on different activities, folders or pages. Figure 4.25 illustrates how to access logs.

Figure 4.26: Example of Outline Report

In this instance in Figure 4.26, the student viewed the YouTube clip once, the matching activity three times and the poem three times.
The Outline Report details scores achieved. In Figure 4.27, this student scored 100 per cent in the game ‘Hangman’ on Sunday 17 March. The student continued to score 100 per cent in the ‘C’est le weekend’ online assignment. This student scored 0, 10, 14, 21 and 86 in the ‘Four young people describe their animals’ task.

**Complete Report**

The Complete Report shows a student’s detailed logs. The Complete report also highlights inactivity on the website. The Complete report does not indicate student results, however.
In Figure 4.28, the student attempted the crossword game on ten occasions, ‘Snakes and Ladders’ and ‘Hangman’ six times each. The reports of the students of Group A are available to view in Appendix I.
Games

Frequent access to the games features is very evident.

Figure 4.29a: Summary of a student’s attempts on ‘Snakes and Ladders’

Figure 4.29b: Summary of a student’s attempts on ‘Hangman’
The popularity of games in Moodle is apparent in the number of hits on ‘Hangman’ and ‘Snakes and Ladders’ in Moodle (Figures 4.29a and Figure 4.29b). Moodle’s Activity Reports show a low rate of hits on YouTube videos in comparison with the hits on ‘Hangman’.

In Figure 4.30a above, the YouTube video http://www.youtube.com/watch?v=WUKLSkea3ns recorded 54 hits whereas there were 687 hits on ‘Snakes and Ladders’ and 1201 hits on ‘Hangman’.
Above in Figure 4.30b, there were 32 hits on ‘Old McDonald’ YouTube clip http://www.youtube.com/watch?v=d2M4MN8OPKE, while ‘Snakes and Ladders’ had 146 hits and ‘Hangman’ received 1216 hits.

Figure 4.30c: ‘Les Animaux du Zoo’ activity

Les animaux à la ferme - Farm animals

<table>
<thead>
<tr>
<th>Activity</th>
<th>Users</th>
<th>Date</th>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Contrôle — contrôles’</td>
<td>12</td>
<td>Wednesday, 17 March 2013</td>
<td>5:37 PM (17 hours 5 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux à la ferme — Farm animals’</td>
<td>43</td>
<td>Tuesday, 5 March 2013</td>
<td>2:09 PM (7 days 6 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Le vieux McDonald’</td>
<td>32</td>
<td>Thursday, 7 March 2013</td>
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<td></td>
</tr>
<tr>
<td>‘Hangman — Les animaux à la ferme’</td>
<td>32/16</td>
<td>Monday, 4 March 2013</td>
<td>6:44 AM (9 days 12 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux à la ferme — Farm animals’</td>
<td>68</td>
<td>Thursday, 20 February 2013</td>
<td>10:46 AM (13 days 11 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Match the words’</td>
<td>9</td>
<td>Wednesday, 5 March 2013</td>
<td>5:55 PM (7 days 21 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Snakes and Ladders — Les animaux à la ferme’</td>
<td>146</td>
<td>Sunday, 3 March 2013</td>
<td>7:20 PM (8 days 11 hours)</td>
<td></td>
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<tr>
<td>‘Crossword — Les animaux à la ferme’</td>
<td>52</td>
<td>Wednesday, 27 February 2013</td>
<td>5:16 PM (14 days 12 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux à la ferme — Millionaire’</td>
<td>139</td>
<td>Tuesday, 5 March 2013</td>
<td>2:10 PM (8 days 16 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Révision des animaux à la ferme’</td>
<td>16</td>
<td>Tuesday, 12 March 2013</td>
<td>9:42 PM (3 days 9 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Memory game’</td>
<td>15</td>
<td>Monday, 11 March 2013</td>
<td>7:19 PM (2 days 9 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Now see how much you know –’</td>
<td>13</td>
<td>Tuesday, 12 March 2013</td>
<td>4:17 PM (1 day 24 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Chat, chat, be wonderland’</td>
<td>23</td>
<td>Wednesday, 11 March 2013</td>
<td>8:57 PM (11 hours 32 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Chat, what do you say’</td>
<td>31</td>
<td>Tuesday, 12 March 2013</td>
<td>8:42 PM (1 day 3 hours)</td>
<td></td>
</tr>
</tbody>
</table>

Les animaux à la ferme - Farm animals

Les animaux du zoo - The zoo

<table>
<thead>
<tr>
<th>Activity</th>
<th>Users</th>
<th>Date</th>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Les animaux du zoo’</td>
<td>4/6</td>
<td>Wednesday, 12 March 2013</td>
<td>5:39 PM (12 hours 51 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux du zoo — Hangman’</td>
<td>12/15</td>
<td>Monday, 11 March 2013</td>
<td>5:57 PM (2 days 11 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux du zoo — Crossword’</td>
<td>8/3</td>
<td>Wednesday, 6 March 2013</td>
<td>2:33 AM (7 days 21 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux du zoo’</td>
<td>17</td>
<td>Tuesday, 12 March 2013</td>
<td>5:41 PM (1 day 18 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux du zoo — Snakes and Ladders’</td>
<td>187</td>
<td>Wednesday, 12 March 2013</td>
<td>5:41 PM (12 hours 41 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Match the picture with the correct word’</td>
<td>23</td>
<td>Wednesday, 13 March 2013</td>
<td>5:39 PM (12 hours 51 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Video assignment’</td>
<td>112</td>
<td>Sunday, 10 March 2013</td>
<td>5:37 PM (2 days 11 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Révision’</td>
<td>21</td>
<td>Tuesday, 12 March 2013</td>
<td>7:13 PM (1 day 13 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Les crocodiles’</td>
<td>16</td>
<td>Wednesday, 11 March 2013</td>
<td>8:14 PM (16 hours 16 minutes)</td>
<td></td>
</tr>
<tr>
<td>‘Les animaux du zoo — The zoo’</td>
<td>29</td>
<td>Monday, 11 March 2013</td>
<td>10:22 AM (3 days 10 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Visite au zoo’</td>
<td>6</td>
<td>Wednesday, 6 March 2013</td>
<td>6:07 PM (7 days 9 hours)</td>
<td></td>
</tr>
<tr>
<td>‘Visite au zoo — Video assignment’</td>
<td>2</td>
<td>Wednesday, 6 March 2013</td>
<td>9:36 PM (7 days 9 hours)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.30c: ‘Les Animaux du Zoo’ activity
In relation to the topic on zoo animals above, a *YouTube* clip teaching vocabulary and pronunciation of zoo animals [http://www.youtube.com/watch?v=zalliMGgweAM](http://www.youtube.com/watch?v=zalliMGgweAM) received 17 hits. ‘Snakes and Ladders’ received 187 hits while ‘Hangman’, received an exceptional 1219 hits (Figure 4.30c). This correlates with the results of Question 9 of the questionnaire where students expressed their preference for games over videos.

3. **Interview**

Question 3 of the interview asked students to name their preferred activities on Moodle.

![Favourite Moodle Revision Game](image)

**Figure 4.31: Favourite Moodle Revision Game**

As presented in Figure 4.31, ‘Hangman’ and ‘Snakes and Ladders’ were the students’ preferred activities. M1 said he preferred ‘Hangman’. He commented “I kept going back to Hangman. I preferred the games.” While F5 liked ‘Hangman’, she also liked ‘Snakes and Ladders’, and spent more time playing ‘Snakes and Ladders’.

While Moodle reports show multiple hits on ‘Hangman’ and on ‘Snakes and Ladders’ students did not use the *YouTube* instructional videos that often. F3 suggested adding “more games, you didn’t need the videos on it. The games did more for helping me learn.”
In Question 5 of the interview, the researcher asked the students “What made you return to Moodle many times?” F3 said “It was so much easier than getting out the textbook. It told you what you got. It was really good”; while M2 liked “The new activities and the different ways that were coming up to learn.”

**Blended Learning**

![Revision Method](image)

**Figure 4.32: How students used Moodle for revision**

Question 6 of the interview asked students if they revised for the tests with Moodle or if they used Moodle in conjunction with their own method. F1 reported that she studied “Mainly with Moodle and when you went to the textbook, you found you knew all of the words.” This knowledge building was also noted by F8 who stated “When I used the website, it was easier to study with the textbook, because I had it done already before.”

As the students’ responses above show, Blended Learning proved more popular than learning with Moodle alone. In the interview, 60 per cent of students (6) stated that they learned using Moodle in conjunction with textbook, while 40 per cent of students (4) learned using Moodle alone.
Question 7 of the interview sought answers to the question “Do you prefer online learning, paper-based learning or Blended Learning?” Despite the popularity of Blended Learning in Question 6 of the interview (Figure 4.32 above), the students stated they preferred online learning. Students’ preference for learning online rather than using textbooks is clear. M1 said “I prefer online based learning because it is fun, easy to use. It is interactive and prevents having to carry heavy books all the time.” F3 echoed M1’s choice of online learning and highlighted the convenience, she stated “Online [learning], because it was easier than revising out of the textbook.”

### 4.5 Conclusion

Both the interview responses and Moodle activity reports indicate that students spend more time playing interactive games than watching video clips or studying the vocabulary files in Moodle.

The Moodle activity reports show that students regularly check their submission status and grades.

Students use Moodle to send messages to classmates online at the same time. An example of online collaboration is in Figure 4.23.

60 per cent of students used Blended Learning: Moodle in conjunction with their textbook, while 40 per cent of the students used Moodle only.
The instant feedback was noted by students as a benefit as they did not have to wait for their results, they also knew immediately how well they knew the topic.
Chapter Five – Discussion of Findings

5.1 Introduction

In Chapter Four, the findings of this case study were presented. This chapter will appraise the findings in more detail and discuss the findings in connection with the literature review presented in Chapter Two.

Overview of the research undertaken

This case study set out to examine the effects of using Moodle on mobile devices as a resource in the learning of French. The study took place in a secondary school in the northwest of Ireland. The participants were a class of First Year students.

In order to investigate student Internet access, connectivity, online activity and their online preferences, students completed an online questionnaire using Survey Monkey. With the aim of comparing and contrasting the learning benefits of Moodle combined with the traditional paper-based methods, with the learning benefits associated with the traditional paper-based methods on their own, the target population was divided into two groups: Group A and Group B, based on pre-test results and Internet access. Each group consisted of students of mixed linguistic ability. Group A used Moodle in conjunction with their textbook. Group B used their textbook only. Following on from that, all students were given a paper-based test at the end of each week. Student questionnaires, test results, Moodle’s activity logs and students’ interview feedback in the post-intervention stage, have been analysed in this study.

Key Findings

The key findings of this case study were as follows:

- All ten students used mobile devices to access the Internet.
- Pupils using a combination of Moodle and paper-based learning achieved better test results on average than those using their textbook only.
- Students in Group A stated a preference for Blended Learning, over learning using Moodle alone.
- Students preferred the games on Moodle to other activities. ‘Hangman’ and ‘Snakes and Ladders’ proved to be the most popular activity.
• 100 per cent of students believed that they spent more time doing French while they had access to Moodle.

• Students rarely looked at the folders containing vocabulary and verbs. In Figure 4.30a, the folder ‘Les Adjectifs 2’ received 37 hits and another folder ‘Les Adjectifs – Adjectives’ witnessed 47 hits. The ‘Hangman’ game, however, received 1201 hits! This suggests that the students may have used Blended Learning; by using their textbooks to learn the spellings and the games to reinforce spelling.

• Submission of Web 2.0 assignments caused problems for approximately 25 per cent of students.

• 100 per cent of students perceived it beneficial to have access to Moodle for learning French.

**Discussion of Findings by Research Question**

This chapter will present these findings in greater detail and aims to determine if the findings are consistent with current theories in this area. The findings will be analysed corresponding to the Research Questions:

• How effective is Moodle in the learning of second-level French?

• How effective are mobile devices in the learning of second-level French?

• How do students use Moodle and what factors influence usage?
5.2 How effective is Moodle in the learning of second-level French?

Test Results
As highlighted in Chapter Two, Howard Gardner proposed seven types of intelligences: visual, aural, verbal, solitary, social, logical and physical. Butler and Mautz (Krippel et al 2010) believed that visual learners benefitted from multimedia while verbal learners experienced little benefit from multimedia. The three students M1, F1 and F2, whose grades decreased, were verbal learners. The results in Table 5.1a backs up Butler and Mautz’s proposal that visual learners benefit more from multimedia than verbal learners.

<table>
<thead>
<tr>
<th>Group A - Moodle and textbook group</th>
<th>A pretest %</th>
<th>test1</th>
<th>test2</th>
<th>test3</th>
<th>Average tests 1,2,3</th>
<th>Final test%</th>
<th>Average of 4 tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>100.0</td>
<td>90.0</td>
<td>100.0</td>
<td>80.0</td>
<td>90.0</td>
<td>80.0</td>
<td>87.5</td>
</tr>
<tr>
<td>F1</td>
<td>90.0</td>
<td>90.0</td>
<td>80.0</td>
<td>80.0</td>
<td>83.3</td>
<td>84.0</td>
<td>83.5</td>
</tr>
<tr>
<td>F2</td>
<td>60.0</td>
<td>60.0</td>
<td>60.0</td>
<td>20.0</td>
<td>46.7</td>
<td>52.0</td>
<td>48.0</td>
</tr>
<tr>
<td>F3</td>
<td>60.0</td>
<td>60.0</td>
<td>100.0</td>
<td>90.0</td>
<td>83.3</td>
<td>80.0</td>
<td>82.5</td>
</tr>
<tr>
<td>F4</td>
<td>60.0</td>
<td>80.0</td>
<td>40.0</td>
<td>80.0</td>
<td>66.7</td>
<td>80.0</td>
<td>70.0</td>
</tr>
<tr>
<td>F5</td>
<td>50.0</td>
<td>60.0</td>
<td>90.0</td>
<td>75.0</td>
<td>71.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>50.0</td>
<td>90.0</td>
<td>50.0</td>
<td>90.0</td>
<td>76.7</td>
<td>56.0</td>
<td>71.5</td>
</tr>
<tr>
<td>M2</td>
<td>40.0</td>
<td>80.0</td>
<td>40.0</td>
<td>90.0</td>
<td>70.0</td>
<td>72.0</td>
<td>70.5</td>
</tr>
<tr>
<td>F7</td>
<td>40.0</td>
<td>30.0</td>
<td>30.0</td>
<td>70.0</td>
<td>43.3</td>
<td>52.0</td>
<td>45.5</td>
</tr>
<tr>
<td>F8</td>
<td>20.0</td>
<td>40.0</td>
<td>20.0</td>
<td>40.0</td>
<td>33.3</td>
<td>36.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Average</td>
<td>57.0</td>
<td>68.9</td>
<td>58.0</td>
<td>73.0</td>
<td>66.8</td>
<td>65.6</td>
<td>66.4</td>
</tr>
</tbody>
</table>

Table 4.1a: Group A

Table 5.1a: Test results Group A

Three students who were in the 60-100 per cent range in the pre-test, showed a decrease in results. As the test results show in Table 5.1a, M1 scored 100 per cent in the pre-test and scored 87.5 per cent on average in the four tests during the intervention, a decrease of 12.5 per cent.

F1 scored 90 per cent in the pre-test and achieved an average of 83.5 per cent during the intervention, a decrease of 6.5 per cent.
F2 scored 60 per cent in the pre-test, while the average of her four tests during the intervention was 48 per cent, a decrease of 12 per cent.

All students who improved using Moodle, were in the 20–60 per cent range of the pre-test results.

F4 scored 60 per cent in the pre-test, yet achieved an average of 82.5 per cent, an increase of 22.5 per cent.

F5 scored 50 per cent in the pre-test and recorded an average of 71.3 per cent in the intervention, an increase of 21.3 per cent.

M2 scored 40 per cent in the pre-test, yet he attained an average of 70.5 per cent in the intervention, an increase of 30.5 per cent.

Question 8 of the interview asked students how they normally revise spellings

<table>
<thead>
<tr>
<th>M1</th>
<th>I just keep reading them, and then I cover them and I say them then.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>You keep on saying the vocabulary over to yourself. Then you write it out.</td>
</tr>
<tr>
<td>F2</td>
<td>I would write them down and look at them again.</td>
</tr>
</tbody>
</table>

**Table 5.2a: Students who recorded a decrease of scores**

Looking at the responses above in Table 5.2a, two students ‘say’ the word. These were verbal learners.

<table>
<thead>
<tr>
<th>F3</th>
<th>I just read over them over and over again. (But it was easier with the Moodle because you were able to write them out over and over again and that helped you learn them more).</th>
</tr>
</thead>
<tbody>
<tr>
<td>F5</td>
<td>I just have to learn them off and cover the word and write it.</td>
</tr>
<tr>
<td>M2</td>
<td>I just look over all the verbs and say them off to myself.</td>
</tr>
<tr>
<td>F6</td>
<td>Just learn it off. I write it down as I’m learning it.</td>
</tr>
<tr>
<td>F7</td>
<td>If I’m learning a spelling, I just cover them over.</td>
</tr>
</tbody>
</table>

**Table 5.2b: Students who recorded an increase of scores**
Studying the responses of the students above, who achieved an increase in scores, one student ‘reads’ the word, another ‘looks’ at the word, while one only student ‘says’ the word. These students in Table 5.2b typify visual learners.

**Interviews**

ICT “enriches learning and enhances teaching” (Department of Education and Science 2007). Students collectively believed that it was beneficial to have Moodle access for learning French. F1 reported that “It was a great way of learning French and portable as well, so you could bring it anywhere anytime” while F4 added “It was a better way of learning. It was fun.”

According to Rosen (Daniels 2012), Moodle is the prominent VLE in higher education. In reply to Question 9 of the interview, which investigated whether students would prefer homework on Moodle or from the textbook, all students chose Moodle as their ideal way of completing homework (see Appendix 8). This is in stark contrast to Question 6 of the pre-intervention questionnaire where students rarely used the Internet for educational purposes (see Appendix 4). Education was their least popular online activity; while searching for information and social networking were their most popular activities.

**Hawthorne Effect**

Moodle activity logs give interesting insights into students’ Moodle activity. It is possible to see when students are logging in, how often, their grades and what functions they use. As students knew their activity was being monitored, did this affect their performance? The Hawthorne effect is a psychological phenomenon where some people work harder and perform better when taking part in an experiment. It is premised that someone will work better because they know they are being observed.

Therefore, any differences in performance between Group A and Group B may be due to the perceived attention that Group A believed that they were getting. To minimize the possible influence of the Hawthorne Effect, all students were given a paper-based test every Thursday, when they finished studying each topic.

Students in Group A unanimously believed that it was beneficial to have access to Moodle for learning French.
Blended Learning
Moodle’s growth is centred on “social constructionist pedagogy” (Moodle 2012). Experts believe that with constructionism, learners learn through doing and making. Tannenbaum suggested that people retain 80 per cent of what they see and do, while they only remember 10 per cent of what they hear. Preferred activities should be used in conjunction with traditional text books in classroom to provide a Blended Learning environment.

In this case study, the researcher used the Face-to-Face Driver method of Blended Learning. In this instance, the researcher delivered most of the curriculum. Moodle provided online resources, notes and games.

In Question 6 of the interview (Appendix G), students were asked how they revised for the tests; with Moodle or if they used Moodle in conjunction with their own method. Blended Learning proved to be the most popular method of learning. 60 per cent of students (6) used Moodle in conjunction with textbook, while 40 per cent of students (4) used Moodle alone. Blended Learning captures “the best of both worlds” (Reed cited in Natsu 2011).

Instructional Design
“Pedagogy must drive educational technology usage rather than the reverse” (Krippel et al 2010). In the planning and design stages of Moodle, sound educational ideas and learning theories were a priority for the researcher. Instructional design has constructivist influences. Vytogsky believed that people learn from others. When a student had a problem submitting an assignment or logging in, their peers in Group A advised them on what course of action to take. The activity reports of Moodle show records of students sending messages to their peers who were online at the same time.

According to the theory of multi-channel communication, greater learning occurs when information is presented using more than one method of communication. Group A used text, audio, video and interactive games; while Group B students only used their textbooks. Group A outperformed Group B in all four tests during the intervention period, even though Group B outperformed Group A in the pre-intervention test.

Tannenbaum highlighted the importance of including interactivity in multimedia. I concur with Drave (Krippel et al 2010) who proposed that the quality of the interaction
was more important than the content. In Moodle, text, images, Web 2.0 activities centred around Xtranormal, Voki, YouTube and games were employed. Though the YouTube clips contained images, music, animation and authentic pronunciation, they were not interactive. Students accessed the games on an extensive level, whereas YouTube clips were not accessed as often. The games gave instant feedback and words of encouragement. Students were able to monitor their grades.

Considering that this Moodle site was developed for use on mobile devices, text was kept to a minimum (Budiu and Nielsen 2012). Krug (2000) recommended cutting half the text, and then cutting half of what remained. Headings were placed at the top of the page to cater for mobile devices. Due to the popularity of mobile devices, consideration must be given to their use, in the design stages of a VLE.

Usability
Usability is not a priority in OSS design. Though Savolainen believed that Moodle’s usability ‘could be better’, it was of paramount importance in the development of this Moodle site. Chapter Two outlined the importance of navigation on mobile devices being ‘automatic and intuitive’. The selection of the ‘MoodleBook’ interface helped alleviate any navigation or usability problems, as it had the same interface as Facebook. As reported in Chapter Four, students experienced no navigation problems with Moodle in Question 10 of the interview (Appendix H). Usability and ease of use were of paramount importance. Usability is especially important for use with mobile devices, due to the small screen sizes. Though Moodle’s usability is not faultless (Savolainen 2010), students in Group A were happy with it.

Students complimented Moodle’s navigation. They experienced little or no navigation problems. Problems were experienced, however, with the submission process in Week 1.

5.3 How effective are mobile devices in the learning of second-level French?

Introduction
Mobile devices have the potential to give instant satisfaction to students by allowing interaction with Moodle and access to information from anywhere anytime. Prensky
(2001) believed that students prosper on “instant gratification.” They have the potential to engage learners and deliver more enthusiasm for learning.

According to ComReg (2013), 75 per cent of those surveyed in their study owned a laptop while 54 per cent owned a smartphone. In the pre-intervention questionnaire, completed by all the students in the class, 85.71 per cent of students used their laptop, while 66.67 per cent of students used a smartphone for Internet access. 33.33 per cent used a tablet while 42.86 per cent used a desktop computer.

In the post-intervention interview, completed by Group A, it was discovered that students used multiple devices for Internet access. Eight students used laptops (8), three students used tablets, two used smartphones and two students used their iPod ‘Touch’ to access the Internet.

**Personalised Learning**

In Chapter Two, mobile devices were defined and their benefits were discussed. In this case study, students used mobile devices. Futurelab (2004) proposed that the popularity of mobile devices is itself a motivator to use them. Mobile devices are personal portable technologies. Mobile devices provide “personalised or individualised connectivity” and lead to increased collaboration and interactivity (BenMoussa 2003, cited in Huang and Liaw 2011). “Personal ownership and personalisation” were cited by Bachmair *et al* (2010). Such personalised learning and ownership of mobile devices can only motivate students to learn.

The findings of this study correlate with BenMoussa and Bachmair’s idea of ‘personalised learning’. In Question 1 of the interview, 80 per cent of students used their laptop, while only 20 per cent of students used a desktop computer to access Moodle. As a student remarked, “You were going to be on your laptop anyways, so you could just go onto Moodle.” Likewise, Roschelle and Paschler also referred to the personal ownership of the device as being a motivating factor.

Futurelab (2004) emphasises the idea of personalised and portable learning. The element of personal possession is a motivational factor. This intrinsic motivation of using one’s mobile device to learn French was evident in the students’ adoption of Moodle.
Except for two instances, students accessed Moodle using mobile devices. This is in stark contrast to Cosgrave et al who stated that a small amount of students accessed the VLE using mobile devices.

Tella (Ally 2004) believed that mobile devices can be used to enhance learning and that there is increased motivation when learning is based on needs and context. I concur with Tella. Students in Group A consistently outperformed Group B. The games provided students with a ‘need’ to learn. Web 2.0 activities, Voki and Xtranormal required students to contextualise what they had learned. Student pride in their work was tangible when they presented their Voki and Xtranormal creations to the class (Passey 1999 in Becta 2003).

**Portability**

In Chapter Two, literature from Futurelab referred to the ‘portability’ of mobile devices which made the learning experience more ‘personalised’. Bachmair et al also described the portability aspect of mobile devices. A number of students highlighted Moodle’s convenience and its portability, it could be accessed anywhere at any time. Tablets and mobile phones can be switched on quickly; there are no delays in learning. Tablets generally have larger screens than smartphones. They can be used for pair work. Screens can be orientated vertically or horizontally. Mobile devices are used on the move for ‘just in time’ learning. Moodle facilitated M-Learning. One student remarked “It was a great way of learning French and portable as well, so you could bring it anywhere anytime.” Another student added “If I was sitting around bored, I just went on and played a few games.”

**Writing for mobile**

Nielsen advocated the removal of ‘fluff’ – the extra words found in text, especially at the start of paragraphs. With this in mind, this Moodle site was developed using minimal text. Krug’s Third Law of Usability, which recommends removing three-quarters of words on the page was taken into consideration. Concise text, using Sans-Serif font ‘Verdana’ was used. Sans-Serif font is easier to read on the small screens of mobile devices. One student applauded this Moodle site for providing the required vocabulary, “all the stuff is all written and everything.”, while another added that “the words were all there.”
3G coverage
While data from the Census of 2011 reveal that secondary school students’ bus journeys to school average 28.20 minutes, one of my student’s journeys to school lasts more than 50 minutes. This time could be used more productively completing online learning activities if students did not have to solely rely on Wi-Fi access. Were 3G more affordable and widespread, students could revise or complete online activities on their way to and from school or in the park at lunchtime. Higher speeds for email access, surfing the Internet and for downloading or uploading data is possible with 3G. Group A Students used Wi-Fi in 15 instances whereas fixed broadband was used only twice (Figure 4.14).

5.4 How do students use Moodle and what factors influence their usage?

Technology Acceptance in Education
Davis’ Technology Acceptance Model is a theory aiming to predict the degree of acceptability of an information system. In the interviews, students unanimously stated that Moodle was beneficial to them. Ease of use is the second element in the equation. The majority of students also stated that Moodle was easy to use. No navigation problems were reported. Two students reported problems with submission of assignments.

Huang and Liaw found that learners’ autonomy was the main reason students adopted M-Learning. The students who adapted well to Moodle were independent and mature. These students had good ICT skills and had few problems with Moodle functions and with the submission of Web 2.0 Voki and Xtranormal assignments. Autonomous learners have the capacity to manage their learning on their own. The promotion of learner autonomy, the provision of rich and interactive course materials, the use of Moodle’s functions and the promotion of learning satisfaction, all contribute to the acceptance of M-Learning.

Moodle usage
Cosgrave et al discovered that 75 per cent of third-level students use a VLE as a lecture note repository. On analysis of Moodle’s activity reports, the researcher found that
students seldom looked at files or folders in Moodle containing vocabulary or verbs. Little activity was experienced on a file containing a poem with text and an image about ‘Mon Chat’. Alier believed that many VLE sessions are short, with students logging in to check news, events or grade results. Moodle activity reports have records of short login times and have evidence of students repeatedly checking their online submission grades.

As Vygotsky proposed, people learn from others. VLEs facilitate sharing of information and are social areas with interaction taking place (Dillenbourg 2000). Moodle’s activity reports have evidence of students collaborating with their peers who were online at the same time. On one occasion a student sent a message to her peer with a query about homework.

**Interactive Games**

Though Cosgrave *et al.* noted that only 14 per cent of third-level students used online games, Moodle’s activity reports reveal high gaming activity. An overwhelming amount of students preferred interactive games that contained a competitive element to improve learning. ‘Hangman’ and ‘Snakes and Ladders’, in particular, were very popular.

Tannenbaum’s contention on the importance of interactivity is especially pertinent in relation to the popularity of games. The interactivity of games clearly appeals to this digital native generation. According to Tannebaum (1998), 10 per cent of what people hear is remembered, while 80 per cent of what people see and do is remembered. The researcher concurs with Tannebaum’s assertions in this regard.

Drave (2000) believed that, for a positive learning outcome, the quality of interaction was more important than the actual content. Interactive games were very popular, while passive learning or one-directional learning from *YouTube* clips were not as popular in Moodle’s activity reports.

**Intrinsic and Extrinsic Motivation**

Moodle was a novelty for students. These Digital Natives, who are interested in technology, are intrinsically motivated to use Moodle to learn French. They found
Moodle to be fun. A student referred to being “entertained” while playing games on Moodle.

Extrinsic motivation was also in place. Students received instant results and feedback from the games. Students look for results and feedback. They commented positively on the feedback given. Prensky believed that these digital natives expect instant feedback and results. Prensky (2001) asserted that these Digital Natives love “frequent rewards.” Juwah et al recommended that tutor feedback is essential in helping students understand a topic.

Productivity is believed to increase when participants are observed or watched. The Hawthorne effect is an extrinsic motivation, which may have played a role in student participation and use in this case study. Furthermore, students believed that they spent more time studying French while they had access to Moodle.

**Web 2.0 Tools**

A movement towards student-centred, student-generated learning has taken place. Here we see the occurrence of the teacher being ‘the guide on the side’ rather than the ‘sage on the stage’.

Learning through doing was witnessed with the design of Voki French speaking avatars. Further constructionism was seen in the scripting and creation of Xtranormal 3D animated movies. There was a good response to YouTube video assignment, where students watched a video, answered questions and submitted responses online.

Unfortunately, Moodle’s activity reports displayed low levels of activity on the non-interactive YouTube links, where students were passive learners. This poor response to passive non-interactivity will be taken into consideration in future and greater interaction will be involved.

**Facebook**

Question 7 of the questionnaire revealed that social networking, e.g. Facebook and Instagram, was the students’ second most preferred online activity. Education was the second least popular online activity in this pre-intervention questionnaire (see Figure 4.20). However in the post-intervention interview, students expressed preference for online learning over traditional methods. There is a noteworthy change in opinion from
the poor use of online resources for educational purposes in the pre-intervention phase to the students expressing preference for online learning over traditional methods.

In Question 7 of the questionnaire, students named their five favourite websites. 12 students preferred Facebook, 5 students preferred YouTube. In view of the popularity of Facebook, the researcher chose Moodle’s ‘Moodlebook’ theme for Moodle. The popularity of YouTube was incorporated into Moodle by including YouTube video clips.

Question 9 of the questionnaire asked students to rate their favourite website in relation to a number of aspects. The use of colours and games were the most popular criteria. As the students expressed a partiality towards Facebook, the similar ‘Moodlebook’ interface was selected. Similar colours and navigation to Facebook were utilised in this Moodle. Students’ fondness for games was taken into account with the inclusion of ‘Hangman’, ‘Snakes and Ladders’ and so on. ‘Hangman’ and ‘Snakes and Ladders’ recorded high activity in Moodle. This correlated with the results of Question 9 of the questionnaire where students expressed their preference for games over videos.

**Short login times**
Alier (2007) discovered that student login times last a short time. He found that log analysis indicated students logged on quickly to check news or grades. In this research, students’ login times were often short. Students regularly checked assignment results.

**Ease of Use**
Cosgrave *et al* proposed that ease of use and intuitiveness were found to be advantageous in VLE adoption. In the post-intervention interviews, students experienced very few problems with navigation in Moodle. Moodle’s interface has one column, when used with mobile devices. Recommendations by Nielsen and Krug to reduce text were considered when Moodle was being developed.
Student Autonomy
In a follow up homework assignment on 29 April 2013, all the class were asked to make a MovieMaker or PhotoStory presentation describing “La Maison” in French. This was open to students in Group A and Group B. Moodle was now accessible to all. With the exception of one student from Group B, only the students in the Group A submitted the presentation. When asked why they did not submit students cited “inability to download programme” or “inability to submit” as reasons.

5.5 What are the inhibiting factors to mobile learning and how can these be resolved?

Restraints
Due to the very nature of this thesis, the researcher wished to buy a 3G tablet computer. Samsung’s ‘Note’ Wi-Fi model was widely available in Ireland. It was almost impossible to buy a 3G version in Ireland or online. 3G iPads were available for purchase in Ireland. While the company Three had a 3G Samsung model for sale, an expensive contract was in place in November 2012. Vodafone, however, offered the researcher a Micro SIM with 15GB data allowance per month for 20 euro. Recently, the company Three had more affordable 3G tariffs (July 2013).

In the course of this study, the researcher changed mobile phone provider from Vodafone to Three. While Vodafone was expensive, the 3G coverage experienced was excellent and high speed. The poor level of 3G coverage experienced with Three was very unsatisfactory and was indicative of the coverage problems experienced in Ireland.
Government Policy
Considering the prohibitive costs of 3G in Ireland, the researcher contacted the Minister for Education and Skills and the Minister for Communications regarding the government policy for 3G and 4G roll out in Ireland (Appendix L). Reference was made to 3G being a right, not a privilege. The greediness of phone operators who monopolise this sector was referred to in this email. The Department of Education and Skills deemed it more appropriate that the researcher contact the Department of Communications concerning this matter. 3G accessibility and affordability hold a key role in facilitating mobile learning, which is becoming a central part of the educational system in Ireland.

5.6 Problems that arose during the Study

Hosting Problems
The researcher encountered problems with the hosting costs of Moodle. On searching the Moodle website, the researcher found reference to two free hosts FreeMoodle and Gnomio.

At the outset, the researcher chose FreeMoodle over Gnomio, due to the presence of advertising on Gnomio.

![Figure 5.2a: Request denied from FreeMoodle](image)
The researcher completed online course request with FreeMoodle. However, the request was refused as it did not comply with site policies. The researcher had requested the site be limited to students. Figure 5.2a above shows the reply received from FreeMoodle.

![Moodle request approved](image)

**Figure 5.2b: Moodle request approved**

The researcher then reapplied to FreeMoodle and stated the site would be ‘open to all learners’. This was accepted. See Figure 5.2b.

![Donation to Gnomio to remove advertising](image)

**Figure 5.3: Donation to Gnomio to remove advertising**

At the same time, the researcher investigated Gnomio and learned that advertising could be removed for 15 euro a month. The researcher subscribed to this to remove advertising. Figure 5.3, above, shows the receipt of donation to Gnomio which removed distracting advertisements.

**Broadband Speed and Connectivity**

The specifications of students’ broadband were not requested in the pre-intervention questionnaire. It should be considered in the future as a small number of students cited
that the “Internet was down” as a reason for online submissions being incomplete. Issues relating to broadband not working, slow broadband speed and pop-up blockers arose in this study.

Submission Problems
A minority of students failed to submit the Voki, Xtranormal and YouTube assignments. In Question 11 of the interview, two students stated that they found difficulty submitting online assignments.

![Amended submission process](image)

**Figure 5.4: Amended submission process**

The submission click was then amended to resolve this issue. After the initial Voki assignment in Week 1, the researcher simplified the submission process (Figure 5.4).

Time Zone Issues
A small number of students found a problem with Moodle’s time zone. When setting up students’ Moodle accounts, the researcher was asked to place the student in a time zone. The researcher was unaware of the importance of the time zone being the same as Gnomio’s in Spain. The time difference in some students’ accounts created minor problems as activities did not always appear at Irish time. M1 commented on this issue in the interview “there was a difficulty with the time zone on the website. It was an hour or two ahead or behind.” The time setting will be considered in future endeavours.
Adobe

F1 reported that “some of the links didn’t work because some people didn’t have Adobe.” Flash based games, did not work on iPads. iPhones and iPads do not support Adobe Flash or Java. This was taken into consideration for later additions to Moodle.

Lack of keyboards

![Figure 5.5: Problems arising due to lack of a keyboard](image)

This space invader style game (Figure 5.5) works well with a desktop computer and on a laptop with a mouse. Tablets generally have no keypad. External keyboards are available to buy, however. Due to the absence of a keyboard, it was very difficult to click the letters on a tablet, so this game was removed.

5.7 Conclusion

On average, Group A outperformed Group B in test results. Did the Hawthorne Effect manifest itself in this study? Was Moodle an effective method for learning or did student grades increase because student online activities were monitored?

The test results showed that seven out of the ten students in Group A recorded grade increases while using Moodle. The top three students in the pre-test scores’ decreased during the intervention phase of the study. These students were verbal learners. This supported Butler and Mautz’s proposal that visual learners benefit more from
multimedia than verbal learners. If a student was absent for a class, this would also have an impact on results.

In the future, students could be given a test to determine what type of learner they are. Greater consideration could be given to intelligence types. More activities could be provided to cater for verbal learners such as the Web 2.0 tool Vocaroo which enables students to verbally record a message and share it using Facebook or email. Students unanimously believed that it was beneficial to have access to Moodle for learning French. Moodle is an asset to learning and it could become a catalyst for educational reform.

Students liked using their mobile devices to access Moodle. The popularity of mobile devices for Internet access was impressive. Mobile devices were motivating and permitted anytime, anywhere learning. The majority of students used mobile devices to access Moodle. The overall effectiveness of mobile devices is indicated by the qualitative results from the interviews. User-generated content saw an increase in student responsibility, risk taking and motivation. If 3G costs were more affordable, students could spend this valuable time en route to school, revising for all their subjects using online activities. If students had greater 3G access, they would have the ability to logon anytime anywhere, thus increasing learning opportunities.

Students showed a strong preference for the games on Moodle rather than other activities. ‘Hangman’ and ‘Snakes and Ladders’ proved to be the most popular games. The researcher discovered that the students rarely looked at the folders containing vocabulary and verbs. The ‘Hangman’ game, however, was attempted 1201 times in one week! The low rate of activity on folders containing vocabulary and verbs suggest that the students may have used Blended Learning; by using their textbooks to learn the spellings and the games to reinforce spelling.

This chapter has discussed restraints to 3G coverage due to expensive 3G and poor coverage. Government policy was also discussed. The cost of 3G in Ireland is deeming it to be exclusive, rather than a right. Until cost of 3G is reduced in Ireland, students are being deprived in the educational field. Problems were encountered with finding a web host. Students encountered problems with broadband speed and connection. Students experienced difficulty with time zone discrepancies and absence of Adobe Flash.
Chapter Six will conclude by highlighting the outcomes of the study. Recommendations for the future use of Moodle in Irish schools will be made.
Chapter Six - Conclusion

6.1 Introduction

This study aimed to examine the effectiveness of Moodle using mobile devices, in the learning of second-level French. The target population was a mixed gender and mixed ability First Year French class in the northwest of Ireland. This chapter will provide a brief summary of the research findings and will offer recommendations for the provision of Moodle on mobile devices.

6.2 Outcomes of the Case Study

The aim of this case study was to examine the design and educational considerations in developing and implementing a French course using Moodle, for use on mobile devices. The objectives of this research were to find out:

- How effective is Moodle in the learning of second-level French?
- How effective are mobile devices in the learning of second-level French?
- How do students use Moodle and what factors influence this usage?

Based on these objectives, the findings indicated that:

- Moodle is effective in the learning of second-level French. Although Group A scored lower than Group B in the pre-intervention test, once Group A had access to Moodle they consistently outperformed Group B.
- Student interviews confirmed the positive effects of mobile devices. Students commented on the convenience of accessing Moodle on their laptops, smartphones or tablets. Two students, F4 and M1, said that they would be using their laptop anyways, so connecting to Moodle would be convenient; while F1 referred to the portability of Moodle, being accessible anywhere at any time.
- Wi-Fi was used by the majority of students as opposed to fixed-line broadband.
- Students spend more time playing interactive games than watching video clips or studying the vocabulary files in Moodle. The games in Moodle were effective in motivating the students to revise. Moodle activity reports record a high number of hits
on ‘Hangman’ and ‘Snakes and Ladders’ games, particularly before a class test (Figure 4.30a).

- In the interviews, students commented on the instant feedback received in Moodle. The feedback was deemed beneficial by F3 who reported “It told you what you got. It was really good.”
- The Moodle activity reports show that students regularly check their submission status and grades.
- Students use Moodle to send messages to classmates who are online at the same time.
- 60 per cent of students in Group A used a Blended Learning approach - Moodle in conjunction with their textbook - while 40 per cent of the students used Moodle only.
- Students perceived that Moodle helped them learn French.

6.3 Recommendations for the use of Moodle in the Learning of Second-Level French

- Provision of in-service courses and training to teachers with guidance on the setting up, development and management of a Moodle site. Due to Moodle’s constructivist influences, which foster collaboration and student-centred learning, priority should be placed on the wider use of Moodle in schools.
- The long term objective would be for the Department of Education and Skills to set up a VLE team to coordinate train and maintain a network of Moodle or similar VLE for all schools in Ireland. In this way, security could be maximised as it would be maintained by a group of specialists.
- This nationwide network of VLEs could facilitate collaboration among students, parents and teachers. Homework and notices could be posted for both students and parents on individual sites. Teams of teachers could collaborate and share resources and best practices through the VLE. Teachers would no longer feel isolated in smaller school departments.
- Teachers and schools to be encouraged to introduce M-Learning on a wider scale. Due to the popularity of mobile devices, and students’ familiarity with them, this valuable learning resource should be utilised to the maximum. The challenge for us as
teachers is to use these effectively and creatively. Mobile devices facilitate learning in a realistic context and allow learners to be active constructors of knowledge. Collaboration involves social interactions in the learning process.

- Ownership of mobile devices permits learning to take place anytime, anywhere and everywhere. This is a major motivational part of M-Learning. The same applies on the teacher’s side of the equation. Teachers can now respond and interact with students outside of school hours via their school portal.

- Learner-centred activities are provided. M-Learning facilitates urgent learning and provides greater interactive opportunities than traditional methods. M-Learning enhances learner autonomy. Communication and interaction features on mobile devices encourage learners to communicate, collaborate and to construct new knowledge.

- Despite limitations in their screen sizes, mobile devices are valuable tools for M-Learning. Learning material must incorporate multimedia content and interactive features rather than depending on text. There is a need to shift from the use of text to a greater use of images, audio and video. As M-Learning has become more personalised and learner-centred, it is vital to understand learners’ acceptance to M-Learning to improve learning outcomes.

- Using mobile devices for learning has implications on how learning material is designed using instructional design principles and learning theories. Educators must consider instructional design principles when designing learning materials for use on mobile devices.

- One way of increasing the provision of M-Learning would be with the provision of affordable 3G. 3G costs in Ireland are exorbitant as compared with other countries. Students are generally resigned to the offer of free Wi-Fi. While Dublin Bus offers free Wi-Fi to its passengers, students in rural Ireland do not enjoy this advantage.

### 6.4 Conclusion

This study has examined the design and educational considerations for the development of a French course on Moodle to be used on mobile devices. The study has demonstrated that the use of Moodle is a very effective learning tool for Second Level students of French. The findings bear out my original thesis that the interactivity and accessibility afforded by Moodle, particularly when students have ready wireless
Internet access – be that Wi-Fi or 3G connectivity through the mobile phone network – is an invaluable asset in learning and cementing students’ knowledge of the French language.
Appendix A: Letter to Parents

Dear Parent/Guardian,

As part of my MA thesis in Digital Media in Education with the University of Limerick, I am investigating ways of improving the teaching and learning of French. Students will complete online questionnaires and carry out a number of online activities and assessments.

There will be complete confidentiality. No student or the school will be identified at any stage. The data and information collected will only be accessible to my tutor and me. I have discussed this study with the students and their role in it.

I would appreciate if you would allow your child to take part in this study. Participation in this study will only enhance their learning of French.

If your child feels uncomfortable at any stage, he/she may withdraw from the study. Please read the attached consent form and sign it. Thank you.

Yours sincerely,

___________________________
Maeve Cormican

Consent Form for Parent / Guardian

I understand that my child will do some short assessments and complete online questionnaires. I also understand that my child’s name and the school’s name will not be revealed. I may withdraw my child’s participation at any time.

☐ I give my child __________________________ permission to take part in a study conducted by Ms Maeve Cormican as part of a research thesis with the University of Limerick.

☐ I do not give my child __________________________ permission to take part in a study conducted by Ms Maeve Cormican as part of a research thesis with the University of Limerick.

Signature of Parent / Guardian

________________________________
Appendix B: Letter to school management seeking permission

Dear Adrian,

As part of my MA thesis in Digital Media in Education with the University of Limerick, I am investigating ways of improving the teaching and learning of French. Students in my First Year French class will complete online questionnaires and carry out a number of online activities and assessments.

The result of the research findings will from part of my Master’s thesis for the University of Limerick and may be published. There will be complete confidentiality. No student or the school will be identified at any stage.

I would like to ask for your permission to carry out this research in your school.

Yours sincerely,

___________________________

Maeve Cormican
Appendix C: Piloted questionnaire

1. Personal details

☐ Personal details Female
☐ Male
☐ 11 years
☐ 12 years
☐ 13 years
☐ 14 years

*  

2. If you travel to school by bus or car, how long does your journey take?

☐ If you travel to school by bus or car, how long does your journey take? 2 - 10 minutes
☐ 11 - 20 minutes
☐ 21 - 30 minutes
☐ 31 - 40 minutes
☐ 41 - 50 minutes
☐ more

*  

3. Which of the following devices do you use to connect to the Internet? (Check all that apply)

☐ Which of the following devices do you use to connect to the Internet? (Check all that apply) Desktop computer at home
☐ Desktop computer at school
☐ Laptop at home
☐ Smartphone
☐ Tablet

4. Which type of Internet connection do you have at home?

☐ Which type of Internet connection do you have at home? Dial Up
☐ Broadband
☐ 3G
☐ None

*  

5. When you use your Smartphone or Tablet, do you use?

☐ When you use your Smartphone or Tablet, do you use? 3G
6. Which of the following Internet applications do you use most? (1 = most used ; 10 = least used)

- News
- Sports news
- E-mail
- Social Networking e.g. Facebook, Instagram
- Google / searching
- Music download
- Movie download
- Education
- Playing online games

*  

7. List your 5 favourite websites. (1 = Favourite website ; 5 = Least favourite website)

List your 5 favourite websites. (1 = Favourite website ; 5 = Least favourite website)

1
2
3
4
5

8. In relation to your favourite website, please rate the following: (1 = Most important ; 5 = Least important)

- Usefulness / information
- Fun / entertaining
- Games included
- Use of colours
Use of animation / video
Appendix D: Questionnaire administered to students

**1. Personal details**

- Female
- Male

**2. What is your age?**

- 11 years
- 12 years
- 13 years
- 14 years

**3. If you travel to school by bus or car, how long does your journey take?**

- 1 - 10 minutes
- 11 - 20 minutes
- 21 - 30 minutes
- 31 - 40 minutes
- 41 - 50 minutes
- More
4. Which of the following devices do you use to connect to the internet? (Tick all that apply)
- Desktop computer at home
- Desktop computer at school
- Laptop at home
- Smartphone
- Tablet

5. Which type of internet connection do you have at home?
- Dial up
- Broadband
- 3G
- None

6. When you use your Smartphone or Tablet, do you use?
- 3G
- WiFi
- Both
7. Which of the following Internet applications do you use most? (1 = most used; 10 = least used)
- News
- Sports news
- Email
- Social networking e.g. Facebook, Instagram
- Google / searching
- Music download
- Movie download
- Education
- Playing online games

8. List your 5 favourite websites. (1 = Favourite website; 2 = Second favourite; 5 = Least favourite website)
1. 
2. 
3. 
4. 
5. 

9. In relation to your favourite website, please rate the following: (1 = Most important; 5 = Least important)
- Usability / information
- Fun / entertaining
- Games included
- Use of colour
- Use of animation / video
Appendix E: Pre-intervention Test
Appendix F: Post-intervention Tests

i. Les animaux domestiques

- Chat
- Cheval
- Chien
- Hamster
- Lapin
- Perroquet
- Poisson rouge
- Souris
- Scooter
- Tortue
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<tr>
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<td><img src="image5" alt="Pig" /> <img src="image6" alt="Rooster" /></td>
</tr>
<tr>
<td><img src="image7" alt="Turkey" /> <img src="image8" alt="Frog" /></td>
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<tr>
<td><img src="image9" alt="Sheep" /> <img src="image10" alt="Duck" /></td>
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</tr>
<tr>
<td><img src="image13" alt="Cow" /> <img src="image14" alt="Cow" /></td>
</tr>
</tbody>
</table>
iii. Les animaux du zoo

- Crocodile
- Elephant
- Girafe
- Kangourou
- Lion
- Ours brun
- Perroquet
- Rhinocéros
- Serpent
- Singe
Appendix G: Interview answers

1. What device was used to access Moodle?
2. Did you like website?
3. What were your favourite activities?
4. Did you spend more time doing French while you had access to Moodle?
5. What made you return to Moodle many times?
6. For the tests, did you revise with Moodle or use Moodle in conjunction with your own method?
7. Do you prefer online or paper based learning or a mixture of the two, Blended Learning? Why?
8. How do you revise with textbook?
9. Would you prefer homework on Moodle or from the textbook?
10. Did you have problems navigating through Moodle?
11. Any difficulties?
12. Any recommendations?
13. Do you think it is useful to have access to Moodle for learning French?
Appendix H: Interview answers

Q1. What device was used to access Moodle?

F2: The computer and my iPod

F1: Laptop, tablet and phone-WiFi

M2: Tablet. (didn’t log on anywhere else)

M1: I accessed Moodle with a laptop and Wifi and I used the iPad as well. Anywhere in the house.

F3: laptop and sometimes my iPod touch. I accessed Moodle on my phone in my Nanny and Grandad’s once.

F4: It was a better way of learning. It was fun. It was easy. You were going to be on the laptop anyways, so you could just go onto Moodle.

F6: Laptop (Wifi in Bedroom)

F5: Laptop. In the sitting room.

F8: Computer(In an office.) laptop( bedroom).

F7: Bedroom.laptop.

2. Did you like website?

F2: Yeah I did.

F1: It was a great way of learning French and portable as well, so you could bring it anywhere anytime.

M2: Yeah I found it helped me learn all the verbs.

F4: It was a better way of learning. It was fun. It was easy. You were going to be on the laptop anyways, so you could just go onto Moodle.

F6: Yeah.

M1: I liked the games because they were easy and fun to play.

F3: The games.
F8: You know if you were looking at it, if you didn’t like study it would still be a help with the spellings.

F5: Yeah!

F7: Yeah I did.

3. What were your favourite activities?

F2: Snakes and Ladders.

F1: It helped me learn the vocabulary easily through the word searches and crosswords and stuff.

M2: Hangman.

F4: Snakes and Ladders.

F6: Snakes and Ladders.

M1: Hangman I kept going back to Hangman. I preferred the games.

F3: The crossword

F8: Wordsearch

F5: I liked the Hangman and the Snakes and Ladders. More time with the Snakes and Ladders.

F7: The crossword. It got you to learn how to spell them as well.

4. Did you spend more time doing French while you had access to Moodle?

M2: Yeah

F4: Yeah

F1: Yeah

F6: Yeah

M1: Yeah
5. What made you return to Moodle many times?
F2: It was handy when you had to study for a test. It made the spellings easier.
F1: It was an easier way of revising for tests than the textbook.
M1: Because it was faster and funnier than the textbook. It was easier to just go on the laptop instead of taking out your textbook and looking at it. It gave good feedback as well.
F4: The words were all there. You didn’t have to look for them. They were just there in ‘Snakes and Ladders’.
M2: The new activities and the different ways that were coming up to learn.
F6: It’s an easier way to revise.
F3: It was so much easier than getting out the textbook. It told you what you got. It was really good.
F8: Just to use the laptop, something different. All the stuff is all written and everything.
F5: It was easier to learn French than out of the book.
F7: If I forgot my book, it was easier to do it on the Internet, to learn stuff.

6. For the tests, did you revise with Moodle or use Moodle in conjunction with your own method?
F2: A bit of both.
**F1:** Mainly with the Moodle and when you went to the textbook, you found you knew all of them.

**M2:** A bit of both, I suppose.

**F4:** A bit of both.

**M1:** I revised using Moodle.

**F3:** Moodle.

**F8:** When I used the website, it was easier to study with the textbook, because I had it done already before.

**F6:** I revised using both.

**F5:** I revised with Moodle.

**F7:** Moodle.

---

**7. Do you prefer online or paper based learning or a mixture of the two, Blended Learning? Why?**

**F2:** The Internet.

**M2:** I think I prefer a mixture of both.

**F1:** I like a mixture of the two as writing things out helps me learn things but learning online is a lot more enjoyable.

**F4:** I prefer both.

**F8:** I prefer learning from the book.

**F6:** Online. It was easier to revise than the book.

**F5:** With the computer. It’s a lot easier.

**F7:** I prefer learning online.

**M1:** I prefer online based learning because it is fun, easy to use, interactive and prevents having to carry heavy books all the time.

**F3:** Online, because it was easier than revising out of the textbook.
8. **How do you revise with textbook?**

F2: I would write them down and look at them again.

F1: You keep on saying the vocabulary over to yourself. Then you write it out.

F5: I just have to learn them off and cover the word and write it.

F6: Just learn it off. I write it down as I'm learning it.

F3: I just read over them over and over again. But it was easier with the Moodle because you were able to write them out over and over again and that helped you learn them more.

M2: I just look over all the verbs and say them off to myself.

M1: I just keep reading them, and then I cover them and I say them then.

F7: If I’m learning a spelling, I just cover them over.

9. **Would you prefer homework on Moodle or from the textbook?**

F2: Moodle

M2: Moodle; it’s more fun.

F4: Moodle

F1: Moodle

F6: Moodle

F3: Just the Moodle

F5: On Moodle

F7: Moodle; it’s funner

F8: Moodle
10. Did you have problems navigating through Moodle?

F2: No
M2: Sometimes but not too much.
M1: Not really
F5: No, it was quiet easy to get around.

11. Any difficulties?

F2: Just the submitting for the tasks
M2: A few with sending (submitting) but not many
F5: No.
F1: I had no problem navigating but the time difference on some users accounts, I was unable to see when the assignments were put up until an hour or two after.
F7: Just logging in once.
M1: There was a difficulty with the time zone on the website. It was an hour or two ahead or behind.

12. Any recommendations?

F3: More games, you didn’t need the videos on it. The games did more for helping me learn.
F2: Make the submitting easier.
F4: Make the submission bit easier.
M1: A few more games on Moodle.
F6: Maybe put more things on it.
F8: Nothing really, I thought it was good.
F5: Some people’s time (zone) was different to others.
F1: Some of the links didn’t work because some people didn’t have Adobe
M2: Just try and make the sending(submitting) a bit easier.
F7: Maybe a bit more games.

13. **Do you think it is useful to have access to Moodle for learning French?**

100% yes.
### Appendix I: Moodle Activity Report

#### Les animaux domestiques - Pets

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#### Les animaux domestiques - Pets

- Four young people describe their animals. Fill in the blanks. Click "hint" for help.

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<td>Les animaux domestiques - Pets</td>
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<td>C'est le weekend - Weekend task</td>
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#### Les animaux à la ferme - Farm animals

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<td>Le vieu Macdonald</td>
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<td>Visite au zoo</td>
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Appendix J: Example of a student’s Moodle Activity report

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- HotPot: Four young people describe their animals. Fill in the blanks. Click "Hint" for help.
  - Score: 90, 10, 14, 21, 80, most recently: Wed, 20 Feb 2013, 1:32 PM

**Folder: Les Adjectifs 2**
- Views: 1, most recently Thursday, 21 February 2013, 4:03 PM

**Assignment: C'est le weekend - Weekend task**

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**Assignment: C'est le weekend task**

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Les animaux du zoo: The zoo

Folder: Les animaux du zoo
6 views - most recently Wednesday, 6 March 2013, 7:42 PM

Game: Les animaux du zoo - Hangman
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Attempt 2: 0:00 - Monday, 4 March 2013, 6:20 PM
Attempt 3: 0:00 - Tuesday, 5 March 2013, 2:13 PM
Attempt 4: 0:00 - Tuesday, 5 March 2013, 2:13 PM
Attempt 5: 0:00 - Wednesday, 6 March 2013, 9:09 AM
Attempt 6: Unfinished - Wednesday, 6 March 2013, 9:11 AM

Game: Les animaux du zoo - Crossword
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Attempt 2: 0:00 - Monday, 4 March 2013, 6:24 PM
Attempt 3: 0:00 - Tuesday, 5 March 2013, 2:18 PM
Attempt 4: 0:00 - Tuesday, 5 March 2013, 5:08 PM
Attempt 5: Unfinished - Tuesday, 5 March 2013, 5:08 PM

Page: Les animaux du zoo
1 view - most recently Tuesday, 5 March 2013, 5:58 PM

Game: Les animaux du zoo - Snakes and Ladders
Attempt 1: 0:00 - Tuesday, 5 March 2013, 5:09 PM
Attempt 2: 0:00 - Tuesday, 5 March 2013, 5:11 PM

Page: Match the picture with the correct word
3 views - most recently Wednesday, 6 March 2013, 5:04 AM

Assignment: Video assignment

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Appendix K: Moodle themes considered by researcher
Appendix L: Letter to Minister for Communications

Dear Minister,

I would appreciate if you could send me government policy for 3G and 4G roll out in Ireland.

Today, phone operators have a monopoly of wireless technologies. Therefore 3G is very expensive in Ireland. Wireless technology is becoming a right NOT a privilege. It should be taken out of the control of private companies.

Carphone Warehouse charge €40 per month on 12 month contract for 3G. They would not sell me my desired SAMSUNG tablet, as I intended putting a Vodafone 3G sim into it. O2 have a dongle device for 3G. This is antiquated.

The high cost of using hotspots on mobile phones should be made illegal. As you pay for the data, it shouldn’t matter how you download that data.

I am completing my masters in the University of Limerick on Digital Media Development in education. I am conducting research into the design and development of mobile learning for my students. Before I begin, this hurdle obstructs my research.

We have to educate and innovate our way out of this recession. This is not being helped by the greed of phone operators.

[Signature]

Declaration:

This electronic message contains information (and may contain files) which may be privileged or confidential. The information is intended to be for the sole use of the individual or entity named above. If you are not the intended recipient be aware that any disclosure, copying, distribution or use of the contents of this information and or this is prohibited. If you have received this electronic message in error, please notify the sender immediately.
3G roll out in Irish schools

Connolly, Breda (Breda_Connolly@education.g)

To: Connolly, Breda (Breda_Connolly@education.g)

From: Connolly, Breda (Breda_Connolly@education.g)

Date: 13 November 2012 14:58

in response to the message from O'Sullivan, Michael (OSullivan, Michael@education)

P: 01 222 4141 ext: 4106

November 2012

Dear Mr Carrow

Thank you for your recent email in relation to 3G roll out in Irish schools.

As this matter is more appropriate to the Minister's colleague Mr Pat Rabbitte, T.D., Minister for Communications, Energy and Natural Resources, I have referred your correspondence to him for his attention and direct reply.

Yours sincerely,
Appendix M: Examples of students’ tests

i. Pre-intervention test
ii. Examples of students’ ‘Les Animaux Domestiques’ test
iii. Examples of students’ ‘Les Animaux à la Ferme’ test
## Appendix N: ‘Hangman’ game statistics

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