On the Effect of Text Messaging on Student Perception of Instructor Immediacy

Paul Hayes

A thesis submitted for the degree of Doctor of Philosophy

Supervisors: Prof. Tim Hall and Dr. Stephan Weibelzahl

Submitted to the University of Limerick November 2010
Abstract

On the Effect of Text Messaging on Student Perception of Instructor Immediacy

Paul Hayes

The quality of the communication between instructors and students has been shown to be one of the key factors in the quality of the learning experience of students. However, as is often the case in higher education, communication between instructors and students is very limited due to such factors as large class sizes, limited contact time and student reluctance to approach instructors. This research investigates the effect of using text messaging for out-of-class communication between instructor and student on student perception of the immediacy of their instructor. Immediacy is defined as behaviour which increases psychological closeness between communicators. Research studies in instructional communication suggest that enhanced instructor immediacy is linked to more positive student-instructor relationships engendering positive attitudes, increased interest and motivation by students as well as improved attendance, retention, engagement and learning. The research question for this thesis was developed from literature reviews in both the fields of instructional communication and mobile learning and also from the findings of a number of preliminary research studies. To address the main research question a year-long research study was conducted into the use of text messaging for out-of-class communication and its effects on student perception of instructor immediacy. Both quantitative measures of immediacy and qualitative feedback from students show that the instructor is perceived as closer, more approachable and responsive when text messaging services are offered. The student feedback also shows that the use of text messaging has other positive effects on student learning experience, including enhanced motivation and engagement.
Declaration

I declare that the work presented in this thesis is to the best of my knowledge and belief original and my own work except as otherwise acknowledged in the text. The material has not been submitted, either in whole or in part, for a degree at this or any other university.

_________________________
Paul Hayes

_________________________
Prof. Tim Hall

_________________________
Dr. Stephan Weibelzahl
Acknowledgements

Firstly, I would like to thank my supervisors Prof. Tim Hall from the University of Limerick and Dr. Stephan Weibelzahl from the National College of Ireland for their help, support and guidance throughout this academic endeavour.

Secondly, I would like to express gratitude to Prof. Stephen Hite from Brigham Young University for his helpful advice and to my friend Paudie Kirby for reviewing the thesis.

Thirdly, I am very grateful to all those who collaborated with me on research publications during the course of this research and to all those who have provided feedback on the work.

I would also like to thank the staff and students of the National College of Ireland for their help and their participation in the studies.

Thanks to my lovely wife Xuehua for her support and understanding during the research work.

Above all, I wish to thank my parents for bringing me into the world and placing such a high value on education.
Related Publications


"Education, therefore, is a process of living and not a preparation for future living."
John Dewey (1859 - 1952)

"Education is what survives when what has been learned has been forgotten."
B. F. Skinner (1904 - 1990)
Table of Contents

1 Introduction ......................................................................................................................... 1
  1.1 Overview .................................................................................................................. 1
  1.2 Benefits of Enhanced Communication ................................................................. 2
  1.3 Importance of Positive Instructor-Student Relationships ..................................... 4
  1.4 Instructor Immediacy .......................................................................................... 5
  1.5 Importance of Out-of-Class Communication .................................................... 6
  1.6 Enhancing Out-Of-Class Communication using Communication Technology ................................................................. 7
    1.6.1 Technology in Higher Education ............................................................... 7
    1.6.2 Mobile Technology ................................................................................... 8
  1.7 Mobile Text Messaging in Education ................................................................. 10
  1.8 Research Goals, Outputs and Contributions .................................................... 11
  1.9 Structure of the Thesis ....................................................................................... 14

2 Instructor Immediacy – Review of Research Literature ............................................... 18
  2.1 Overview .............................................................................................................. 18
  2.2 Instructional Communication .............................................................................. 19
  2.3 Instructor Immediacy .......................................................................................... 20
  2.4 Immediacy and Affinity ..................................................................................... 20
  2.5 Taxonomy of Learning ....................................................................................... 21
  2.6 Types of Learning in Higher Education ............................................................. 23
  2.7 Early Research on Immediacy ........................................................................... 24
  2.8 Nonverbal Immediacy ......................................................................................... 25
  2.9 Effect on Affective Learning ............................................................................... 26
  2.10 Measuring Cognitive Learning ........................................................................... 27
  2.11 Effect on Cognitive Learning ............................................................................ 28
  2.12 Measurement of Nonverbal Immediacy and Limitations .................................. 29
  2.13 Verbal Immediacy and Student Learning ......................................................... 30
3 Mobile Technology in Education – Background and Literature Review

3.1 Overview

3.2 The Mobile Revolution

3.3 Transparent Immediacy

3.4 Widespread Adoption of Mobile Technology

3.5 Mobile Device Adoption by Young People

3.6 Growth of Mobile Messaging

3.7 Characteristics of Text Messaging

3.8 Mobile Technologies in Education

3.8.1 Introduction

3.8.2 Definition and Characteristics of Mobile Learning

3.8.3 Limitations of Mobile Learning

3.8.4 Learning and Teaching Activities

3.8.5 Classification of Mobile Learning Systems

3.8.6 Text Messaging in Education

3.8.6.1 Text Messaging to enhance Classroom Interaction

3.8.6.2 Text Messaging for Administrative Purposes

3.8.6.3 Text Messaging for Micro-Learning Activities

3.8.6.4 Text Messaging for Out-of-Class Student Support

3.8.7 Concerns with Text Messaging in Education

3.9 Conclusions

3.10 Summary
4 Preliminary Research Studies

4.1 Overview

4.2 First Study: Mobile Usage and Perception of Mobile Learning

4.2.1 Purpose and Description of Study

4.2.2 Results and Conclusions

4.3 Second Study: Use of Text Messaging for Instructor-Student OOC Communication

4.3.1 Purpose and Description of Study

4.3.2 Results and Conclusions

4.4 Third Study: Guidelines for Text Messaging

4.4.1 Purpose and Description of Study

4.4.2 Discussion and Conclusions

4.5 Fourth Study: Experience of Sending Text Messaging for Administrative Purposes

4.5.1 Purpose and Description of Study

4.5.2 Discussion and Conclusions

4.6 Summary

5 Methodology

5.1 Overview

5.2 Research Question

5.3 Research Study

5.3.1 Introduction

5.3.2 Experimental Design

5.3.3 Single-Blind Experimental Procedure

5.3.4 Experimental Treatment

5.3.4.1 Text Messaging Application

5.3.4.2 Categories of Text Messages

5.3.4.3 Guidelines on Sending and Receiving Messages

5.3.5 Methods of Data Collection

5.3.5.1 Generalised Immediacy (GI) Scale

5.3.5.2 Perceived Nonverbal Immediacy Behaviors (PNIB) Scale
5.3.5.3 Student Perception of Text Messaging Service ...................... 114
5.3.6 Consent, Confidentiality and Anonymity.............................. 115
5.4 Summary..................................................................................... 117

6 Results and Discussion............................................................................................. 119
6.1 Overview ..................................................................................... 119
6.2 Levels of Participation................................................................. 120
6.3 Analysis of Messages Sent/Received ............................................. 122
6.4 Results from Immediacy Instruments............................................ 125
6.5 Student Perception of Use and Impact of Text Messaging Service .... 130
6.5.1 Quantitative Data....................................................................... 131
6.5.2 Qualitative Feedback................................................................. 136
6.6 Discussion..................................................................................... 141
6.7 Summary..................................................................................... 143

7 Conclusions and Future Perspectives ............................................................... 145
7.1 Overview ..................................................................................... 145
7.2 Summary of Findings on Immediacy .............................................. 147
7.3 Impact on Student Learning Experience ....................................... 148
7.4 Limitations of Study..................................................................... 149
7.5 Concerns with Instructor-Student Text Messaging ...................... 152
7.6 Guidelines for Instructor-Student Text Messaging ....................... 155
7.7 Future Perspectives...................................................................... 157
7.7.1 Further Studies ....................................................................... 157
7.7.2 Other Channels of Immediacy.................................................. 157
7.7.3 Future of Instructor-Student Test Messaging ............................. 158

References .............................................................................................................. 161
List of Tables

Table 4.1 Results of Survey on Out-of-Class Text Messaging Service  
Page 77

Table 5.1 Categorisation of groups participating in the study  
Page 99

Table 6.1 Numbers of participants for each group in the study  
Page 121

Table 6.2 Rates of participation for each class involved in the study  
Page 122

Table 6.3 Number of messages sent and received during study  
Page 123

Table 6.4 Descriptive Statistics for Measurements using the GI scale  
Page 126

Table 6.5 Descriptive Statistics for Measurements using the PNIB scale  
Page 127

Table 6.6 Results of ANCOVA analysis on showing effect of duration of previous exposure to instructor (covariate), status of student (full-time vs. part-time) and text messaging on GI scale  
Page 130

Table 6.7 Results of ANCOVA analysis on showing effect of duration of previous exposure to instructor (covariate), status of student (full-time vs. part-time) and text messaging on PNIB scale  
Page 130

Table 6.8 Responses by participants in treatment groups to section A of questionnaire using 7-point Likert scale  
Page 132
List of Figures

Figure 3.1 Total number of mobile subscription worldwide (ITU 2010) Page 40

Figure 3.2 Total number of mobile subscriptions in the Republic of Ireland (ComReg 2010) Page 41

Figure 3.3 Total volumes of SMS messages, MMS messages and Mobile Call minutes for the Republic of Ireland (ComReg 2010) Page 45

Figure 3.4 A general classification of mobile learning systems (from Georgieva et al. 2005 – modified) Page 51

Figure 5.1 Structure of groups used for main study Page 100

Figure 5.2 Screenshot of the MyPhoneExplorer Application Page 105

Figure 6.1 Effect of text messaging on General Immediacy Scale Page 128

Figure 6.2 Effect of text messaging on Perceived Nonverbal Immediacy Behaviors (PNIB) Scale Page 128
1 Introduction

1.1 Overview

Effective communication between instructor and student is very important in the quality of the learning experience of students in higher education. Hill et al. (2003) used student focus groups to answer the question of what quality education means to students. Four themes emerged from the study, the most important being the quality of the instructor in terms of delivery, feedback to students and relationship with students in the classroom. However, there are many factors that limit communication between instructors and students. This chapter outlines the motivation behind this research which is to improve the quality of communication between instructors and students in third-level education and hence the quality of the student learning experience. This is attempted by providing an additional communication channel as a means of enhancing the communication between instructor and student. Positive instructor-student relationships and effective communication have been shown to be very important in terms of student learning experience. The concept of instructor immediacy is introduced in this chapter and its significance in terms of effective communication and student learning experience is outlined. The potential of student-instructor communication outside of normal class time for enhancing student perception of instructor immediacy is discussed. Mobile communications, and especially text messaging, is identified as a possible means of providing an additional channel for out-of-class communication and hence as a possible means of enhancing student perception of instructor
immediacy. The goals of the research, the expected outputs as well as the contributions it makes are detailed. An overview of the structure of the thesis is also provided.

1.2 Benefits of Enhanced Communication

The motivation behind this research is a desire to find new ways of improving the quality of teaching and learning for students in higher education. It goes without saying that the quality of student learning is of great importance to any educational institution. The provision of a quality education is of utmost importance for all stakeholder groups, including the institutions themselves, the student, the teaching staff, industry, the government and society in general. The provision of high quality education should be the raison d’être of every institution of higher education. A high quality education is one of the most valuable assets that students can obtain in their lives.

One of the most important factors in the quality of student learning, and one which is very often overlooked, is the quality of the relationship between instructor and student and the openness and effectiveness of the communication between them. Research has shown that the communication between instructors and students is one of the key factors in the quality of the learning experience of students (Hill et al 2003). Enhanced communication between instructors and students has been linked to positive instructor-student relationships, engendering positive attitudes, increased interest and motivation by students (Christensen and Menzel 1998; Christophel 1990; Ellis 2004).
1. Introduction

However, in higher education contact time between instructors and students is often limited to only a few hours a week. Class sizes can be quite large and students can feel intimidated about asking questions in front of peers. Instructors may seem remote or unwilling to communicate. It is usually the case that students have very little interaction with their instructors and so it is difficult for the students to develop positive interpersonal relationships with them.

These are some of the issues that motivated the investigation into possible ways of increasing the availability of instructors to students in a way that would not impact too much on the mobility of instructors and their busy schedules. Research has shown the importance of out-of-class communication between instructors and students in developing instructor-student relationships and its positive effects on student motivation and learning (Jaasma and Koper 1999; Kuh 1995).

The possibility of a student being able to send a message to an instructor outside normal class times and from anywhere they wished was considered. In addition, the possibility of an instructor choosing when and where they would read and respond to the student’s message was also considered. It was felt that such communication might have an effect on student perception of the quality of their learning experience. This level of availability required a communication system that was both asynchronous, like email, and also ubiquitous, so that it could be used anytime and from anywhere. In order to support these requirements and to evaluate the effect of such communication on student perception of their learning experience it was decided to make a mobile text service available to students for out-of-class communication with their instructor. By attempting to improve the communication
between instructor and student by providing an additional channel for out-of-class communication using text messaging it was hoped to reap some of the benefits of enhanced immediacy, including more positive instructor-student relationships and improved student interest, motivation and learning.

1.3 Importance of Positive Instructor-Student Relationships

The discourse on quality of education is very extensive but perhaps the most basic and vital parts within any educational setting are instructors and students. While the instructor-student relationship may be viewed as just one variable in the educational framework this isolated variable is infinitely important and continues to intrigue educational researchers (Dobransky and Frymier 2004). Students commonly identify the quality of their instructor in terms of delivery in the classroom, feedback during class and in assignments, and the instructor’s relationship with them, as the most important factor in the quality of their education (Hill et al 2003). Research studies have highlighted the importance of positive instructor-student relationships as well as the link between instructor-student relationships and learning (Dobransky and Frymier 2004; Frymier and Houser 2000). It has also been shown that students report higher levels of engagement and learning at institutions where faculty engage and interact with students and value enriching educational experiences (Umbach and Wawrzynski 2005). Positive instructor-student relationships engender positive attitudes, increased interest and motivation by students and also encourage positive open communication (Christensen and Menzel 1998; Christophel 1990; Ellis 2004).
1.4 Instructor Immediacy

Positive open communication behaviours by instructors have been found to be central to the learning process for students (Pogue and Ahyun 2006; Rodriguez 1996; Witt 2000). In fact, the whole area of instructional communication is based on the assumption that messages, both verbal and nonverbal, from instructors have the potential to significantly affect student learning. This would suggest that improved instructor communication behaviour can lead to enhanced learning and may also positively affect student perception of the quality of their learning experience (Witt 2000).

When it comes to instructor-student relationships, and instructor communication behaviour in particular, one very important construct is that of instructor immediacy. Immediacy is defined as behaviours, both verbal and nonverbal, that reduce physical or psychological distance between individuals (Andersen 1979; Mehrabian 1969, 1971, 1981). Research in instructional communication suggests that improved immediacy leads to more positive instructor-student relationships engendering positive attitudes, increased interest and motivation by students as well as improved attendance, improved retention, improved student engagement and improved learning (Allen et al 2006; Andersen et al 1981; Chesebro and McCroskey 2001). For this reason instructor immediacy should be treated with great importance by any person or institution concerned with improving the quality of student learning (Witt 2000).
Immediacy is based on the principle of approach-avoidance that “people approach what they like and avoid what they don’t like” (Mehrabian 1981, p.22). In traditional classrooms students generally perceive the immediate behaviour of their teachers as expressions of personal warmth and affinity toward them (Ryans 1964), which in turn enhances student affinity for the teacher, course, and subject matter (Andersen 1979). Research studies show a linear relationship between student reports of instructor immediacy behaviours and perceptions of motivation, and of cognitive and affective learning (Christensen and Menzel 1998; Pogue and Ahyun 2006; Witt and Wheeless 2001).

While instructor immediacy and its effects on student learning has been extensively researched for over 30 years since the construct was initially created by Andersen (1978) most of the work has been based on classroom interaction. Some research work has also been done on the effect on immediacy of communication between instructors and students outside of normal class time (Jaasma and Koper 1999). This thesis investigates if student perception of instructor immediacy can be affected by the adoption of new communication technology to support learning. In particular the effect on immediacy of the use of mobile text messaging for out-of-class communication between instructor and student is explored.

1.5 Importance of Out-of-Class Communication

Formal or informal communication between instructors and students outside of normal class time is referred to as out-of-class communication. The importance of out-of-class communication to the development of positive instructor-student
relationships and the enhancement of student learning experience should not be underestimated. Students who engage in out-of-class communication with instructors have relationships with instructors that are more interpersonal in nature than students who do not engage in such communication (Dobransky and Frymier 2004). While it cannot be stated that all out-of-class communication between instructors and students is beneficial, research shows that out-of-class communication between instructors and students can help build more positive instructor-student relationships and hence increase the quality of student learning (Noels et al 1999; Vaughn and Baker 2004). It has also been shown that out-of-class communication enhances student perception of instructor immediacy and credibility, helps builds trust between the parties and motivates students in their learning (Jaasma and Koper 1999; Myers 2004).

1.6 Enhancing Out-Of-Class Communication using Communication Technology

1.6.1 Technology in Higher Education

Technological developments have brought about a transformation in higher education. The use of information and communication technology (ICT) in education demonstrates that new technology-based models of teaching and learning have the power to enhance student learning and improve educational outcomes. As well as having many advantages the application of these new technologies also introduces many challenges. Among them is the cost of technology, its rapid
1. Introduction

evolution, and the special knowledge and skills required of its users which pose substantial barriers to effective utilisation (Dede 2008).

Traditionally out-of-class communication between instructors and students in higher education has been restricted and usually limited to short conversations, typically at the end of class or in the corridor. Due to technological developments new methods of supporting such communication have recently emerged, most noticeably the use of email. While the use of email has many advantages it does not have the same quality of interpersonal communication that text messaging has. The availability of email is not as universal as that of text messaging and email messages are generally delivered to an email account on a server while text messages are delivered directly to a person’s mobile device. This research examines the possible use of mobile text messaging for out-of-class communications between instructors and students and its effect on student perception of instructor immediacy. In addition, the impact of such text messaging on the instructor-student relationship and the student learning experience is also considered.

1.6.2 Mobile Technology

Of all the technologies that are now available one in particular that has a huge potential for enhancing communication in education and making it more effective and efficient is mobile communication technology. There are a number of reasons for this. One of the most important is the fact that never before has there been a communication technology so widely available that can be used for educational
purposes. Mobile devices are used by almost all young people and nearly every higher education student in Europe has at least one. Mobile technology has the added advantages that it is also relatively cheap and easy to use (Colley and Stead 2003). Students in higher education, and young people in general, have an affinity with their mobile devices and are surprisingly open to the possibility of using their own mobile devices for educational purposes, as long as cost is not prohibitive. The opportunity for the enhancement of education that this presents should not be overlooked.

The use of mobile technology to support and enhance education is known as mobile learning, or m-learning. There have been many documented cases where mobile communication has been used to support learning, including interaction and learning in collaborative groups, enquiry-based learning, constructivist and socio-constructivist learning activities as well as peer-to-peer communication and out-of-class communication between instructors and students (Hoppe et al 2003; Houser et al 2002; Roschelle 2003; Sharples 2002). Mobile learning has the advantages of being spontaneous, portable, personal and situated, it can also be informal, unobtrusive and ubiquitous (Kukulska and Traxler 2005). Ubiquitous implies that mobile learning takes learning closer to being ‘anytime, anywhere’.

While mobile learning studies demonstrate many advantages of using mobile technology in education very few, if any, have focussed on its potential to enhance the effectiveness and quality of the communication between instructor and student. For this reason this research is of importance to those involved in education because it makes a link between the use of mobile technology in education,
enhanced communication between instructor and student and improved student learning experience.

1.7 Mobile Text Messaging in Education

Mobile text messaging, known as SMS in many countries, has been exploited for supporting learning in a variety of ways and in different educational settings. Mobile text messaging provides a means of facilitating frequent interaction amongst students and instructors. This interaction engenders feelings in students of being valued, leading to better attendance, student retention and deeper and more meaningful engagement in learning. Text messaging in particular is suitable for supporting out-of-class communication between students and instructors since it has the property of being asynchronous, as with email, whereby both parties do not have to be using their devices at the same time in order to send or receive messages. It also has the important advantages of being reasonably affordable and ubiquitous as there are very few students and instructors these days who do not own at least one mobile device capable of sending and receiving text messages (Hayes and Weibelzahl 2009).

There have been numerous examples of where text messaging has been used to support education. An interesting research study by Griffith University in Australia relates the experience of a female instructor using out-of-class text messaging as a means of staying in touch with her students and how it can be used as a way of providing connection and community for first year students (Horstmanshof 2004). Another study by Kingston University in the UK used out-of-class text messaging
1. Introduction

to provide a form of ‘mobile scaffolding’ at a fundamental level to support the
needs of first-year students, and guide students towards independent self-
management (Stone 2004). Text messaging may also be used to encourage
interactivity in the classroom. This results in a more active learning environment,
facilitating the building of learning communities. It provides greater feedback for
instructors and aids student motivation (Markett et al 2006).

While there has been quite a lot of work done in the area of mobile learning and
some on the use of text messaging in supporting students education surprisingly
little has been done on the use of mobile communication to enhance the quality of
communication between instructors and students and to positively affect the
relationship between them. There is no doubt that the quality of the communication
between instructor and student has a bearing on the quality of the student learning
experience.

1.8 Research Goals, Outputs and Contributions

This research is primarily concerned with the question of whether mobile
communication technology can be employed in education to improve the quality of
the communication between instructor and student. In particular the research looks
at how out-of-class communication using mobile text messaging between instructor
and student could be used to enhance the quality of the communication between
instructor and student. Immediacy is a key factor in terms of the quality of the
communication that takes place between instructor and student. The research
considers whether out-of-class text messaging can lead to enhanced perception of
instructor immediacy among students. In addition, the research looks at student attitude to the use of text messaging for out-of-class communication with their instructor and its perceived impact on their learning experience.

This research attempts to address the following questions:

1. What does the research literature tell us about instructor immediacy and the effects of student perception of instructor immediacy on student learning experience?

2. What is the effect of the use of mobile text messaging for out-of-class communication between instructor and student on student perception of instructor immediacy?

3. How do students evaluate the use of text messaging for out-of-class communication with their instructor and its impact on their reported learning experience?

4. What do the research studies tell us about the guidelines (if any) that should be observed by instructors and students engaged in out-of-class text messaging?

The second question above is the main research question for this thesis. As this research is interdisciplinary in nature, bringing together the field of mobile learning and the field of instructional communication, it is hoped that the outputs from the research contribute to both the fields and may also be of significance to those
interested in using innovative means to improve communication in education and enhance the quality of higher education in general.

The outputs expected from the research work are as follows:

- A review of current research literature on instructor immediacy and the effects of student perception of instructor immediacy on student learning experience.

- A review of current research literature on the use of mobile technology in education, and in particular the use of mobile messaging in supporting learners.

- Presentation of findings from research studies on the effect on student perception of instructor immediacy resulting from the use of out-of-class mobile text messaging.

- Evaluation by students of the use of mobile text messaging for communication with their instructor and its impact on their learning experience.

- A set of guidelines for out-of-class mobile text messaging between instructor and student.

This research may be significant for individual instructors who are open to looking at new ways of improving their teaching, their relationship with their students and student learning experience. It may also be significant for institutions of higher education as it highlights the importance of effective instructor-student...
communication and positive instructor-student relationships for quality of education.

The findings should also be of interest to researchers in the fields of mobile learning and instructional communication. For researchers, it shows the effect on student perception of instructor immediacy of the use of text messaging for out-of-class communication between instructor and student. Instructor immediacy is very important in terms of the quality of the communication between instructor and student as well as the learning experience for students.

1.9 Structure of the Thesis

The thesis is made up of seven chapters and is structured along the following lines. Chapter 1 provides an introduction to the research and highlights the importance in education of positive instructor-student relationships and effective communication. The construct of instructor immediacy is highlighted as being very important for effective communication and for enhancing the quality of the student learning experience. Chapter 1 also introduces the field of mobile learning and the use of mobile text messaging in education. The main goals and outputs of the research are also introduced and the contributions of the research to the fields of mobile learning and instructional communication are outlined.

Chapter 2 provides a review of research literature in instructional communication and shows how the literature supports the importance of positive instructor-student relationships, effective communication and instructor immediacy on student
learning experience. The impact of instructor immediacy on student learning is discussed. In addition, other benefits of improved immediacy are identified from the literature. An explanation for the effect of enhanced instructor immediacy on student learning is presented and some factors that impact on immediacy are identified.

Chapter 3 provides a review of research literature in the area of mobile learning and the use of mobile communication technologies in education. Some background and history to the development of mobile technology is presented. The widespread adoption of mobile technology, especially amongst young people, is discussed. The uses of mobile technology in education and its limitations are described. Due to its characteristics text messaging is identified as being particularly useful for providing support for students and as a means of improving communications. The different ways that text messaging is used in education are categorised and described, including its use for out-of-class support for students. A few concerns about the use of text messaging in education are also identified.

Chapter 4 describes a number of preliminary research studies that were conducted prior to the main study. The results of a survey used to elicit feedback from students on their perceptions of the use of mobile communications in education are presented. The main findings of a small pilot study on the use of mobile text messaging for out-of-class communication between instructor and student are also outlined. The outcome of a number of focus group meetings that looked at potential concerns students may have about the communication and ways of addressing these concerns is also presented and discussed as is an interview with a member of staff.
about their experience of sending text messages to students on a regular basis, albeit for purely administrative purposes.

Chapter 5 outlines the main research question for the thesis and the methodology that was used to address it. The design of the main study is described in detail as is the experimental procedure and treatment used and the methods of data collection employed. Due to the need to measure immediacy in a real educational setting the main study uses a quasi-experimental design of treatment and control groups to isolate other factors that may affect the immediacy. The study involved over a hundred students from eight different classes and took place over a full academic year.

Chapter 6 presents and discusses the results of the main study including a statistical analysis of quantitative data on the effect of text messaging on student perception of instructor immediacy as well as an analysis of the impact of other factors that can affect immediacy. In addition, both quantitative and qualitative data in the form of feedback from students shows the attitudes of students towards the use of text messaging for out-of-class communication with their instructor and their perceptions of the effects of the text messaging on their learning experience.

Finally, Chapter 7 presents a summary of the findings of the main study and also outlines its limitations. Both quantitative measures of immediacy and analysis of the feedback from students clearly demonstrate the effect on student perception of instructor immediacy of the use of text messaging for out-of-class instructor-student communication. Some potential concerns associated with the use of text
messaging for instructor-student communication are also discussed along with the importance of using text messaging judiciously and the need for guidelines on the sending and receiving of messages. Some directions for future work are also identified including further research studies and the possible use of other technologies to provide communication channels which could also lead to enhanced immediacy.
2 Instructor Immediacy – Review of Research Literature

2.1 Overview

This chapter presents a review of contemporary research literature on instructor immediacy. Instructor immediacy is one of the most important research topics in the field of instructional communication. The construct of immediacy is very important in terms of instructor communication behaviour and student learning experience. There is a close relationship between immediacy and affinity as instructor immediacy behaviours impact on student affinity for the instructor, course and subject matter.

Instructor immediacy impacts on different types of learning that take place in education. Bloom’s taxonomy outlines three different learning domains and it is evident from the research literature that instructor immediacy has its strongest effect on learning in the affective domain. Affective learning is very important in terms of education and the imbalance resulting from the emphasis placed on cognitive learning in higher education is highlighted.

Early research work done on immediacy and its impact on student learning focussed on nonverbal immediacy behaviours and demonstrated that they have a strong impact of student affective learning. There were some issues initially regarding the measurement of cognitive learning and different strategies were
adopted by different researchers. The key findings of research studies on the effect of instructor immediacy on student cognitive learning are outlined and discussed in this chapter. Research work on verbal immediacy and its effect on student learning are also described. Some explanations for the way in which immediacy operates and other factors that may affect the impact of immediacy on student learning are outlined, including subject divergence, culture and whether instructors can actually change their communication behaviours to become more immediate to their students. Some conclusions from the discussion of instructor immediacy and its effects on student learning are also presented.

2.2 Instructional Communication

The early research work on immediacy in educational instruction resulted mainly from efforts by researchers to bring together the research literature in the field of communication with the research literature in the field of education which was specifically focused on identifying instructor behaviours which made teaching more effective in the classroom (McCroskey et al. 1996). The result of this work was the research field of instructional communication which focuses on the interaction between instructors and learners and informs educators about the communication skills necessary to function competently. Instructional communication also highlights the central role that communication takes in the learning process. Research topics in instructional communication include instructor immediacy, interpersonal relationships with students, listening and feedback, nonverbal communication and also effective teaching strategies (Simonds 2001). The entire field of instructional communication is based on the assumption that
instructors have the potential to significantly affect student learning by the use of messages, both verbal and nonverbal (Witt 2000).

2.3 Instructor Immediacy

Instructor immediacy has attracted a great deal of attention from researchers in the field of instructional communication (Freitas et al. 1998) and according to Witt (2004) no other construct has received more attention during recent times. Originally conceived of as nonverbal communication behaviours by instructors that either increase or decrease the degree of psychological distance between instructor and students (Andersen 1979), it was later redefined by Gorham (1988) to include verbal behaviours as well. A significant body of research has found that positive open communication behaviours by instructors are central to the learning process. This would suggest that improved instructor communication behaviour can lead to enhanced learning and may also positively affect students and their perception of the quality of their learning experience (Christensen and Menzel 1998; Pogue and Ahyun 2006; Witt and Wheeless 2001).

2.4 Immediacy and Affinity

Immediacy is very closely associated with the affinity between people. Affinity can be defined as the feeling of attraction, closeness and/or liking that a person may have for another person or thing. Affinity has been shown to be one of the most important functions of human communication and has a central role in conflict
2. Instructor Immediacy – Review of Research Literature

management and avoidance (McCroskey and Richmond 1992). In their work on the
affinity-seeking function of communication, Bell and Daly (1984) included the use
of immediacy behaviours as an affinity-seeking technique. Research on affinity
suggests that in general the only real influence one person has over another is the
influence that is granted by the other person. Students will usually comply with,
rather than resist, reasonable instructions if they like, respect and admire their
instructor (McCroskey and Richmond 1992).

Research on instructional communication suggests that certain nonverbal
behaviours by instructors such as physical proximity (Argyle and Dean 1965;
Mehrabian 1971), direct eye contact (Argyle and Dean 1965; Kendon 1967),
smiling (Ekman and Friesen 1975) and head nods (Mehrabian and Williams 1969)
can be used to express affinity with or liking for students (Witt 2000). In traditional
classrooms students generally perceive the immediate behaviour of their teachers
as expressions of personal warmth and affinity toward them (Ryans 1964), which
in turn enhances their affinity for the instructor, course and subject matter
(Andersen 1979).

2.5 Taxonomy of Learning

Before discussing the effects of instructor immediacy on student learning it is
important to differentiate between the different types of learning that can take
place. When student learning in higher education is considered however, very often
only one type of learning behaviour, known as cognitive learning, is referred to. In
fact the assessment structure and learning outcomes are usually geared towards
evaluating cognitive learning alone. There are however other types of learning which take place that may be just as valuable. Bloom’s Taxonomy (1956) can be used to understand the different types of learning that can take place. It categorises the hierarchy of learning behaviours into three interrelated and overlapping learning domains; the cognitive (knowledge), affective (attitude) and psychomotor (skills).

Learning in the cognitive domain involves mental processes such as knowledge manipulation and the development of intellectual skills. These include the recall or recognition from memory of specific facts, pattern recognition and concepts that help in the development of intellectual abilities. There are six major categories of cognitive learning behaviours and these categories can be thought of as degrees of difficulties. That is, the first one must be mastered before the next one can take place. The six categories are: knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom 1956). In contrast, learning in the affective domain includes the manner by which people deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations and attitudes. There are six categories of affective learning behaviours: listening and awareness, responding and active participation, valuing, organisation and internalising values. Learning in the psychomotor domain includes physical and kinesthetic movement, coordination and mastery of activity. They include the use of the sense organs to obtain cues that guide motor activity, readiness to act, imitation and skillful performance of motor acts that involve complex movement patterns (Simpson 1972).
2.6 Types of Learning in Higher Education

While all three domains are important, educational institutions usually place most emphasis on student cognitive learning. The imbalance that exists between the cognitive and affective learning domains in education is further underlined in the following quote by Picard et al. (2004) from their seminal publication “Affective Learning – A Manifesto”:

“The use of the computer as a model, metaphor, and modelling tool has tended to privilege the ‘cognitive’ over the ‘affective’ by engendering theories in which thinking and learning are viewed as information processing and affect is ignored or marginalised. In the last decade there has been an accelerated flow of findings in multiple disciplines supporting a view of affect as complexly intertwined with cognition in guiding rational behaviour, memory retrieval, decision-making, creativity, and more. It is time to redress the imbalance by developing theories and technologies in which affect and cognition are appropriately integrated with one another.” (Picard et al., 2004, p.1)

As is the case with many areas of research in education, research in the use of mobile technologies to support learning has also tended to place much more emphasis on cognitive learning than affective learning. In comparison to the volume of research work that has been done on enhancing cognitive learning through the use of mobile technology there has been very little attention paid to its potential for enhancing affective learning even though research suggests that affective learning is critical to the quality of the learning experience of students and is more effective in producing lifelong learners (McCombs 1991). When it comes to instructional communication, results of research suggest that instructor
immediacy may have its strongest impact on student learning behaviour in the affective domain (McCroskey 1994). In fact, affective learning has been identified as the central causal mediator between instructor nonverbal immediacy and cognitive learning amongst students (Andersen et al. 1981; Rodriguez 1996).

2.7 Early Research on Immediacy

Immediacy as a concept was first introduced by Mehrabian (1969) who conceptualised it as those communication behaviors that "enhance closeness to and nonverbal interaction with another" (p.203). Using approach-avoidance theory to develop the concept of immediacy, Mehrabian (1981) suggested that "people approach what they like and avoid what they don't like" (p.22). He developed sets of verbal and nonverbal communication behaviours that contribute to reducing the perceived physical or psychological distance between communicators (Mehrabian 1969, 1971). There were indications from some early studies that nonverbal immediacy behaviours might have some effects on learning (Witt et al. 2004).

The first educational research publication on the effect of immediacy was by Andersen (1979), based on her doctoral dissertation of the previous year (Andersen 1978). Andersen’s (1979) study was the first to document a significant relationship between student perceptions of teacher nonverbal immediacy and learning outcomes (Witt 2000). This study provided the basis for subsequent investigations by researchers of the effects of immediacy on student learning.
2.8 Nonverbal Immediacy

Andersen (1979) developed the instructor immediacy construct based on the existing literature on nonverbal communication behaviour. The purpose of the construct is to allow the effect of certain nonverbal instructor behaviours, often called immediate behaviours, including instructor eye contact, facial expressions such as smiles and nods, body posture, forward leans, movement, gestures, and vocal pitch to be examined in relation to student learning. Anderson et al. (1979) created an observational methodology for measuring instructor immediacy, called the Behavioral Indicants of Immediacy (BII) scale that was found to be reliable and to have high predictive validity.

The BII scale is composed of low-inference items relating to instructor behaviour. The scale is made up of 15 instructor behaviours (e.g. smiles, gestures, body posture) that are each rated by a learner on a 7-point Likert-type continuum. Anderson et al. (1979) also developed a high-inference scale called the Generalised Immediacy (GI) to measure a general or gestalt impression of a learner’s overall level of instructor immediacy. The scale that consists of nine items each rated on a bi-polar continuum (Witt et al. 2004). Measures from the GI scale were highly reliable and highly correlated with scores from the BI scale (McCroskey and Richmond 1992).
2.9 Effect on Affective Learning

Research studies on instructor immediacy showed a significant relationship between instructor nonverbal immediacy behaviours and students' affective learning, but no measurable relationship with cognitive learning as measured by test grades (Andersen 1978, 1979; Andersen et al. 1981). In the first decade of research on instructor immediacy there were some reports of a link between nonverbal immediacy and student cognitive learning (Kelley and Gorham 1988) but the research showed much more consistent findings on a link between nonverbal immediacy and student affective learning (Kearney et al. 1985; Plax et al. 1986). These studies also reported a link between teacher nonverbal immediacy and greater liking and affinity for the instructor and subject.

Enhanced instructor immediacy has been linked to more positive instructor-student relationships engendering positive attitudes, increased interest and motivation by students (Christensen and Menzel 1998; Christophel 1990; Ellis 2004). A review of research literature in higher education reveals positive relationships between student perception of instructor immediacy and the following desirable qualities: improved attendance, improved retention, improved student engagement, improved classroom behaviour as well as improved student satisfaction (Allen et al. 2006; Kearney et al. 1985; Rocca 2004; Witt et al. 2004).

It has been shown that the nonverbal behaviour of instructors serve as mediators for instructors’ verbal behaviours. The instructors’ nonverbal immediacy has more
influence over student affective learning than the verbal control strategies that are employed (Plax et al. 1986).

2.10 Measuring Cognitive Learning

From the earliest days of research in instructor immediacy there were difficulties in trying to study its impact on student learning. Many instructors were reluctant or unwilling to cooperate with researchers as they did not want their teaching behaviours reported on (McCroskey and Richmond 1992). Plax et al. (1986) attempted to solve the problem by collecting data from students about the previous class they had attended. Thus data could be collected from students about a wide range of unidentified instructors even though some of the individual instructors may not have been willing to cooperate if asked to do so. While this method helped to overcome some of the problems with assessing the impact of instructor immediacy on affective learning it made the measurement of cognitive learning even more difficult. There were problems with developing standardised measurements for comparing cognitive learning in different fields, for example history and physics. The difficulty in establishing valid measures long impeded study of variables that impact on cognitive learning (McCroskey and Richmond 1992).

One approach considered was to use the final grades students received on courses, however students’ grades often have little relation to what students learned cognitively on a course. Grades may be based more on assignments submitted, class participation and attitude. Many researchers began to use student reports of
their own learning as a measure of cognitive learning while assessing the impact of instructor immediacy (McCroskey and Richmond 1992). While not a true valid measurement of cognitive learning it did provide useful information about student learning and allowed comparisons to be done. The student self-report approach was first used by Richmond et al. (1987) and continued to be used extensively in subsequent work.

### 2.11 Effect on Cognitive Learning

Anderson’s (1979) original BII scale was modified slightly by Richmond et al. (1987) and renamed the Nonverbal Immediacy Behaviours (NIB) instrument. When the NIB instrument was used together with student self-reports of learning the results were quite revealing (Richmond et al. 1987). When students were asked to describe their best and worst instructors, immediacy behaviour alone permitted 95% accuracy in classifying instructors. Results also revealed a link between instructor immediacy and student reports of cognitive learning but suggested that the relationship may be nonlinear. The results suggested a certain amount of immediacy may be crucial for a moderate amount of cognitive learning by students but increased levels of immediacy beyond that point may have very little impact (McCroskey and Richmond 1992).

Kelley and Gorham (1988) designed and carried out a laboratory experiment, the results of which made a very important contribution to the understanding of the relationship between instructor immediacy and cognitive learning. All the content used in the experiment was novel and students were taught individually. While the
2. Instructor Immediacy – Review of Research Literature

results could not prove a relationship in a “real” classroom, taken with the results of the study by Richmond et al. (1987), they provided a strong case for a meaningful and positive relationship between nonverbal immediacy and student cognitive learning as well as affective learning (McCroskey and Richmond 1992).

The 15-item Nonverbal Immediacy Behaviours (NIB) first used by Richmond et al. (1987) was further revised and abbreviated by McCroskey et al. (1996) to include just 10 items and was renamed the Perceived Nonverbal Immediacy Behaviours (PNIB) instrument (Witt et al. 2004).

2.12 Measurement of Nonverbal Immediacy and Limitations

Andersen (1979) developed two measurement scales for nonverbal immediacy, namely the low-inference Behavioral Indicants of Immediacy (BII) scale and the high-inference Generalised Immediacy (GI) scale. It was also reported by Andersen (1979) that both scales were highly reliable measures. Due to some concerns over the face validity of the BII scale the GI scale was generally accepted as the better of the two. However, there was also some criticism of the GI scale as the correlation between data gathered from students and instructors was quite small. Researchers concluded that this was due to the high-inference nature of the instrument. The GI instrument is still used extensively in education to measure a general or overall level of instructor immediacy and was chosen for use in the main study. However, as is the case in many studies of nonverbal immediacy, it was decided to use a low-inference instrument along with the GI scale to measure nonverbal immediacy in this study.
Richmond et al. (1987) re-examined the BII scale, removing any references to comparison of instructors, and generated a new scale known as the Nonverbal Immediacy Measure (NIM) to measure immediacy. The new 14-item scale was reported to have high validity and has been used extensively by researchers in instructional communication since then. However, the items related to touch and sitting or standing while teaching were found to be poor items and reliability analysis showed that these could be eliminated without impacting on overall reliability. The scale was modified by McCroskey et al. (1995) who removed four of the original items to produce the 10-item Perceived Nonverbal Immediacy Behaviors (PNIB) scale that was chosen for use in the main study. While McCroskey et al. (1995) reported that the PNIB scale was highly reliable since then there have been attempts to produce even more reliable measurements of nonverbal immediacy. Richmond et al. (2003) developed an instrument for measuring nonverbal immediacy known as the Nonverbal Immediacy Scale (NIS) and reported that it was more reliable than both the 14-item NIM scale and the 10-item PNIB scale. However, the NIS still includes the items on touching students and standing and sitting and this was one of the main factors in deciding to use the 10-item PNIB scale instead.

2.13 Verbal Immediacy and Student Learning

Mehrabian (1969, 1971) had maintained that certain verbal behaviours could result in immediacy. Nevertheless, it was not until Gorham’s (1988) study reported a moderate correlation between verbal immediacy and both student reports of cognitive learning and affective learning that researchers in instructional
communication became really interested in verbal immediacy. Using the same measurement scale of nonverbal immediacy as used in the Richmond et al. (1987) study, Gorham (1988) demonstrated a strong relationship between nonverbal immediacy and affective learning and also replicated the findings of the Richmond et al. (1987) study in terms of the relationship between nonverbal immediacy and cognitive learning. Gorham (1988) also developed a 20-item measure for verbal immediacy, known as the Verbal Immediacy Behaviours (VIB) instrument, through the use of student focus groups. Results showed a relationship between instructor verbal immediacy and student reports of affective and cognitive learning. Gorham’s (1988) measure for verbal immediacy was subsequently used by many other researchers to investigate the impact of verbal immediacy (Christensen and Menzel 1998; Christophel 1990; Frymier 1994a). There are also some indications that learning outcomes produced by instructors’ verbal behaviours are mediated by instructors’ nonverbal behaviors (Kearney et al. 1988; Plax et al. 1986; Witt and Wheeless 2001).

2.14 Explaining the Impact of Immediacy

While there is a substantial base of research literature on immediacy most of this has come about through observation and discovery (McCroskey and Richmond 1992). Most studies on the effects of immediacy generally agree about the positive relationships between instructor immediacy and student outcomes but there is little agreement about the mechanism through which it works (Witt et al. 2004). Approach-avoidance theory is often used to explain nonverbal immediacy (Mehrabian 1969, 1981). People generally move closer to those they like, and
farther away from those they don’t. It is possible that the resulting perceptions of physical or psychological closeness may serve as rewards (Witt et al. 2004). There is no doubt that immediacy is closely associated with and serves to enhance the affinity between people (McCroskey and Richmond 1992). Verbal immediacy is often explained in terms of speech accommodation theory (Witt et al. 2004). People change the manner and content of their verbal communication to suit the receiver and context. Thus verbal immediacy behaviours serve to enhance closeness between people (Mehrabian 1981).

While several learning models have been used to try to explain the effects of instructor immediacy on student learning none has proven to be fully consistent (Witt et al. 2004). Kelley and Gorham (1988) argued that immediacy works by mental arousal, which is turn improves attention. Heightened attention improves memory, which in turn enhances cognitive learning. Basically they argued that a student cannot learn if they are not mentally aroused (Witt et al. 2004). Another explanation put forward is that immediacy may serve to increase students’ state motivation to learn, which in turn enhances their learning (Christophil 1990; Frymier 1994). Instructors who engage in immediate behaviours are more likely to increase the state motivation of students to learn by stimulating and directing them (McCroskey and Richmond 1992). Rodriguez et al. (1996) put forward an explanation that immediacy may enhance affect for the instructor and course content, thereby enhancing cognitive learning (Witt et al. 2004).
2.15 Related Factors

When dealing with the research literature on immediacy and the results of research studies on the effect of immediacy on student learning experience there are some other factors which may need to be taken into account. These factors can have an effect on the way student perceive the immediacy behaviours of their instructor, on the immediacy level of instructors and the impact of immediacy on student learning experience.

2.15.1 Immediacy and Subject Divergence

Research would suggest that student perception of instructor immediacy and its effect on student affective learning are somewhat dependent on the type of subject being taught. Kearney et al. (1985) studied the effect of nonverbal immediacy on student affective learning across different types of course content. Divergent classes were categorised on a scale ranging from P-type classes (e.g. management) that focussed primarily on people-oriented content to T-type classes (e.g. accounting) that focussed on product or task-oriented content. The results suggested that the magnitude of the immediacy and its effect on student affective learning varied according to the type of course content. Students in P-type classes were found to be particularly sensitive to immediacy-related instructor communication behaviours as a function of the type of course content taught (Kearney et al 1985).
2. Instructor Immediacy – Review of Research Literature

2.15.2 Immediacy and Culture

There is good reason to suspect that the impact of immediate behaviours of instructors may vary from one culture to another. The vast majority of the research studies on immediacy to date “have focussed on the White, middle-class, American culture” (McCroskey and Richmond 1992, p.113). However the impact of culture has not been totally ignored by researchers. Sanders and Wiseman (1990) and Powell and Harville (1990) both studied the effects of instructor immediacy in different subcultures in California. Powell and Harville (1990) found only very small differences among White, Latino and Asian-American subgroups with regards to the effects of immediacy. Sanders and Wiseman found that the association between immediacy and affective learning was somewhat larger for the Hispanic group than for the other groups. The White group did not differ significantly from the other groups.

McCroskey et al. (1996) conducted a study of the effects of instructor immediacy in several different countries, namely Australia, Finland and Puerto Rico as well as the US. In all cases increased instructor immediacy resulted in enhanced affective learning. The available research suggests that the relationships between immediacy and learning are very similar in many cultures. The cross-cultural studies broadly suggest that although different cultures have differing perceptions and expectations of instructors, immediacy behaviours are broadly considered as positive instructor behaviours that enhance student learning (Witt 2000).

A study by Menzel and Carrell (1999) found that gender of student or instructor did not appear to be a factor affecting a student's willingness to ask questions in class.
The study did report that students’ perceived learning is generally higher in classes where the instructor is of the same gender. However, this effect was strongly mediated by the instructor's verbal immediacy behaviour.

### 2.15.3 Immediacy Training of Instructors

While there is a definite relationship between immediate behaviour by instructors and student learning, the question must be asked if these finding can be translated into meaningful improvements in the classroom (McCroskey and Richmond 1992). Studies have shown that instructors can be trained in nonverbal communication behaviours that make them more immediate to their students. A study by Richmond et al. (1986) compared immediacy of trained and untrained instructors and found that the students of trained instructors were more immediate and had more affect for both their instructor and the subject. Some instructors have gone so far as to say that “being more immediate has saved them from burnout” (McCroskey and Richmond 1992, p.117).

### 2.16 Conclusions

Instructor immediacy is very important in terms of the effectiveness of the learning process and is linked to the affinity a student feels with their instructor and subject matter. Immediacy impacts on the three domains of learning as defined in Bloom’s (1956) taxonomy, but has its greatest impact on student affective learning, while affecting the other two learning domains as well but to a lesser extent. Early research on nonverbal immediacy showed a link with affective learning. There
were a number of issues however with measuring cognitive learning and this lead to the use of student self-reports of learning as the main method of measure by many researchers. The use of this method revealed links between instructor immediacy and student affective and cognitive learning outcomes as did other studies in experimental settings. Research on verbal immediacy also revealed links with student affective and cognitive learning.

While there may be a lot of empirical evidence from research studies on the effect of instructor immediacy on student learning, to date there is no generally accepted explanation of how it works. One of the most prominent explanations is that it arouses students’ interest, enhancing their memory function and so improving cognitive learning. Another explanation is that it increases students' state motivation to learn, which in turn enhances their learning.

When dealing with the effect of instructor immediacy on student learning it should be borne in mind that it is culturally dependent to some extent, however research suggests that improved instructor immediacy generally leads to enhanced affect irrespective of cultural background. Moreover it may be possible for instructors, through training, to increase their immediacy level and that there are benefits for instructors who improve their immediacy.

McCroskey and Richmond (1992) concluded from the research on instructor immediacy that increased immediacy results in increased student motivation and affect for the instructor and the subject matter. While there is still more work to be done most researchers now agree that increased instructor immediacy leads to
enhanced student cognitive learning. Enhanced instructor immediacy results in
greater affinity between instructor and students and so reduces student resistance to
instructors’ attempts to influence their learning. Lastly, and very importantly,
instructors can be taught new communication techniques to help them to be more
immediate to their students.

2.16 Summary

The field of instructional communication was briefly introduced in this chapter as
was the construct of instructor immediacy and its association with affinity in the
classroom. The different types of student learning that can take place are outlined
and the strong effect of instructor immediacy on student affective learning is
discussed. Current research literature on the effects of nonverbal and verbal
instructor immediacy on student learning, both affective and cognitive, is reviewed
and some explanations are put forward for the impact of immediacy. Other factors
that can influence the impact of instructor immediacy on student learning are
mentioned, including the cultural dependency of immediacy and the possibility of
training instructors to be more immediate.
3 Mobile Technology in Education – Background and Literature Review

3.1 Overview

The potential use of mobile technologies in supporting learning offers significant advantages for educators and learners alike. As well as reviewing the research literature on the use of mobile technology in education this chapter also provides a background to the evolution of mobile technology and its widespread adoption, both from a technological and social perspective. Some of the reasons why young people in particular have so readily accepted and adopted mobile technology are also examined. The use of text messaging has seen phenomenal growth since records began in 1999 and it has become very much a social phenomenon. Text messaging is especially popular with young people and has made an impact on their culture.

Based on the research literature on the use of mobile technology in education, a definition for mobile learning is put forward as are its main characteristics. While there are many different teaching and learning activities that can be supported by mobile learning, it does however have some limitations that should be considered. Mobile learning systems are generally classified according to their main characteristics. There are many examples in the research literature of the use of text messaging to support students and their learning. A review of the literature reveals...
that the uses of text messaging in education fall generally into four categories. Each of these categories is outlined in this chapter and examples from each category are presented. In addition, some concerns regarding the use of text messaging in education are discussed.

3.2 The Mobile Revolution

Mobile technology can trace its roots back to the research carried out in the late 1800’s on radio signals by such eminent scientists as Maxwell and Hertz and to Marconi’s pioneering work on wireless communication. The growth of wireless communication was greatly aided by the development of the vacuum tube by De Forest in 1906 and maritime communication, along with broadcast radio, were two of the first areas where wireless communication was used extensively, especially following the Titanic disaster in 1912 when there was a requirement that passenger ships maintain a 24-hour radio watch. The development of the transistor in the late 1940’s was the next major development and large operators such as AT&T began the integration of radio-based telephone devices with traditional switched telephony systems (Ling 2004).

The concept of the cellular network originated from Bell Labs in 1969 when they proposed the use of cells to cover metropolitan areas. Throughout the 1970’s commercial companies investigated how the available wireless bandwidth could best be utilised. Motorola was the first company to launch a hand-held radio-telephone that worked in a cellular system. The 1980’s saw the development of new standards for mobile communication, including the Advanced Mobile Phone System (AMPS) in the United States and the Global System for Mobile (GSM) in
Europe. The second-generation (2G) digitally-based GSM standard was an instant success and supported international roaming, the Wireless Application Protocol (WAP) and very importantly the Short Messaging Service (SMS) for text messaging. At the same time technological advances meant that mobile handsets were reducing in size and weight. The 1990’s saw many enhancements to the GSM standard including the incorporation of the General Packet Radio Service (GPRS) for faster data transfer, often referred to as 2.5G. The early 2000’s saw the launch of third-generation (3G) mobile technology which allowed much higher data transfer rates (Ling 2004). Along with technological developments the number of mobile subscribers has seen dramatic growth since the 1980’s. The International Telecommunications Union (ITU) estimates that 90% of the world’s population is now covered by a mobile cellular network and that there are currently approximately 4.65 billion mobile subscriptions worldwide. This compares with 1.4 billion in 2003 and 2.75 billion in 2006, as shown in Figure 3.1. Since the end of 2006 there have been 1.9 billion net additional mobile cellular subscriptions globally. Over 1.6 billion of these were in the developing world, compared to fewer than 300 million in the developed world (ITU 2010).

![Graph showing global mobile cellular subscriptions, total and per 100 inhabitants 2000-2009](image.png)

Figure 3.1. Total number of mobile subscription worldwide (ITU 2010)
As of the first quarter of 2010, according to the Commission for Communications Regulation in Ireland (ComReg), there were 4,835,905 mobile subscriptions, excluding broadband modem subscriptions, in the Republic of Ireland and mobile penetration was just above 108%, which was slightly less than the European average. Figure 3.2 below illustrates the total number of mobile subscriptions in Ireland since the first quarter of 2006. The total number of mobile subscriptions decreased during the first half of 2009 but has increased slightly since then.

![Figure 3.2 Total number of mobile subscriptions in the Republic of Ireland (ComReg 2010)](image)

### 3.3 Transparent Immediacy

One of the main driving forces in the development of communication media is the desire for transparent immediacy. Transparent immediacy implies that those who wish to communicate can do so without any limitations in terms of location, distance and time (Hamill and Lasen 2005). The process of media evolution does
not seem to follow a regular pattern and the goal of transparent immediacy is still a long way off. Mobile communication technology can be seen as the most recent attempt to make communication much more immediate. With mobile technology it is possible to contact another person at any time irrespective of their geographical position. This property of mobile communication is often referred to its ubiquitous or the ‘anytime anywhere’ nature. When it comes to providing suitable communications systems to enhance the immediacy of communication in education this property is of immense importance.

3.4 Widespread Adoption of Mobile Technology

Mobile technology has become very reliable and widely accessible. It has been adopted on a very large scale and has become part of the social landscape. As mobile technology becomes more and more pervasive in society it competes with social coordination by prearrangement allowing for direct contact and communication with others that is in many ways more immediate, interactive and flexible. Mobile technology allows people to contact others almost immediately by calling or sending a text message to change plans as new circumstances arise (Ling 2004). Mobile communication is viewed as the most personal form of communication because of the immediacy and intimacy of social contact it allows (Taylor and Harper 2002). Unlike fixed communication systems the use of mobile communication means the person who wishes to initiate the communication does not need to know the location of the person they wish to communicate with. This has many advantages and makes planning and social coordination much easier. Research supports the view that one of the greatest social consequences of mobile
3. Mobile Technology in Education – Background and Literature Review

technology is that it challenges the traditional method of timekeeping as a way of coordinating everyday activities (Ling 2004).

The omnipresence and pervasiveness of mobile communication devices in society enables ubiquitous connectivity between individuals and others in their social group. However, a possible downside of making communication so much easier is that many people have become dependent on their devices for maintaining connectivity. Research has revealed that some people have even become emotionally attached to their devices. Mobile communication would seem to be the preferred mode of personal communications for the foreseeable future, especially among young people (Vincent 2005).

3.5 Mobile Device Adoption by Young People

Mobile device ownership, adoption and use are by now almost universal and are particularly high among young people who have created their own culture around them. Young people in particular have adopted mobile communication to facilitate their social interaction and to coordinate with others in their social group. It provides them with a means of accessing other members of their peer group at ‘anytime-anywhere-for-whatever-reason’ (Ling 2004, p.85). The use of mobile communication can also be seen as an action by a young person to align themselves with their peers in a social group. As a result, the social networks of young people become more tightly bound together. The adoption of a mobile device gives young people independent control over their own channel of communication and has
become a part of their everyday life. Research also shows that many even view their mobile device as a fashion accessory (Ling 2004).

3.6 Growth of Mobile Messaging

Mobile technology supports many different types of communication, depending on the standard that is being used and the capability and functionality of the mobile devices. Most devices support some form of asynchronous messaging whether it is text messaging (SMS), multimedia messaging (MMS) or email. Asynchronous communication means that the receiver can view and respond to a message at a later time than when it was sent. Some devices also support synchronous communication in the form of instant messaging usually via a web browser. Increasing numbers of devices allow connection to the Internet or a wireless network (Wi-Fi), file transfer using Bluetooth or infrared and also support for location-based services based on GPS.

Mobile text messaging has revolutionised the way people communicate. In fact the Short Messaging Service technology that text messaging is based on was originally designed in the 1980’s for quite a different purpose, which was that of sending short data messages of up to 160 characters at the same time as speech for checking and monitoring the network. However, with the development of the GSM standard the technology was made redundant but a decision was made by the GSM standardisation body to include it in the standard as a means of sending and receiving non-voice data messages (Taylor and Vincent 2005). At that time the future popularity of SMS text messaging could not have been foreseen.
There has been dramatic growth in the volume of text messaging since records began in 1999 and it has become very much a social phenomenon, particularly with young people (Reid and Reid 2005). During December 2009 alone over 9.6 billion texts were sent in the UK. The figure below shows the volumes of text messages, multimedia messages and mobile call minutes for the Republic of Ireland since the first quarter of 2006 (ComReg 2010).

Text messaging is particularly popular with young people and teenagers. Half of teenagers in the U.S.A. send 50 or more text messages a day, or 1,500 texts a month, and one in three send more than 100 texts a day, or more than 3,000 texts a month. Teenage girls between 14 and 17 send the most text messages, averaging 100 messages a day. Text messaging is now the primary way that teenagers contact their friends, and is used more than face-to-face contact, email and voice calling (Lenhart et al. 2010).
3.7 Characteristics of Text Messaging

Text messaging has many characteristics that make it so attractive for use including the fact that it is virtually instant, location independent and personal. In addition it is relatively inexpensive, convenient and unobtrusive (Ling 2004). These factors mean that it is widely accessible and mobile devices that support text messaging are now pervasive in society and are almost omnipresent. Text messaging has many advantages over mobile voice calling as it is seen as quicker, more convenient and more inconspicuous. It is often difficult to price and budget for voice calls while texting in comparison is cheap and has a fixed cost.

Texting is personal and private in nature and is a form of interaction between individuals. As the messages themselves are asynchronous a recipient can view their messages at any time and do not have to pay attention to them when they are being sent. In addition, as the communication is text-based and asynchronous in nature the sender of a message can spend as much time as they want thinking about the content of a message before sending it and they can also manipulate the delay in the interaction. This can be a very useful ability in terms of communication. Text messaging is used extensively to coordinate social networks particularly among young people and can help to build relationships (Ling 2004). It has been viewed by some researchers as a type of gift-giving and is very much a part of the culture of young people (Taylor and Harper 2002).
3.8 Mobile Technologies in Education

3.8.1 Introduction

The widespread use of mobile devices, particularly by young people, offers new and exciting possibilities for supporting learning. The accessibility, mobility and pervasiveness properties of mobile technology allow support for learning at any time and in any place (Hayes 2004). With the use of mobile devices for learning support, or mobile learning as it is more commonly known, learning and support for students is no longer confined to the classroom. Mobile learning (m-learning) allows access to information and learning materials from anywhere and at anytime and allows learners more control over what, when and where they want to learn. Some of the many benefits are the general student learning gains derived from increased enthusiasm, motivation, confidence and a sense of ownership. Other benefits of m-learning are the increased independence and self-initiated learning in students, and the extension of learning beyond the classroom (Hayes 2004). While mobile technology is still relatively new and emergent, its application to teaching and learning has the potential to offer significant advantages (McManus 2002). Research evidence about m-learning can be found across most subject areas, and across all phases of education. The potential for mobile technologies in education is enormous and there has been considerable research effort concerning the creation of an effective pedagogy for m-learning (Mifsud 2004; Sharples 2005).
3. Mobile Technology in Education – Background and Literature Review

3.8.2 Definition and Characteristics of Mobile Learning

Mobile Learning is concerned with learner mobility and enabling learners to engage in educational activities without the constraints of having to do so in a restricted physical location such as a classroom. This is accomplished by the use of mobile wireless devices to support ubiquitous learning activities. Typical examples of such devices are mobile phones, smartphones, palmtops, personal digital assistants (PDAs), tablet PCs, laptops and personal media players (Kukulska-Hulme 2005). Many researchers and educators view mobile learning as the immediate descendant or subset of e-learning. However, the various mobile devices need to be considered together and in the context of their suitability and appropriateness to different types of content and content delivery. Access to the learner’s private learning environment through a mobile device imposes constraints as to what type of learning might be advisable, possible or appropriate. From a learner-centred perspective the definition of mobile learning must view the learner and their learning environments as being mobile and not focus exclusively on devices (Laouris 2005).

3.8.3 Limitations of Mobile Learning

From both the psychological and pedagogical perspective there are limitations to the quality and type of learning that can take place using a mobile device (Shudong and Higgins 2005). People who are working at a desk are unlikely to choose a device such as a mobile phone as their first preference for learning over other devices such as computers and media players. Mobile phones are generally
designed for communicating and not for learning. Mobile phones are also regarded as being very personal so delivering learning content to them may be viewed as intrusive. As mobile learning is self-initiated and independent it can also be very difficult to monitor. From the technical standpoint the size of the screen on a mobile device makes it difficult to view images and text and while manufacturers are now making larger screens there will always be a limitation on the size of the screen as the devices need to be portable. In addition input to a mobile device is relatively slow and inconvenient. There are also issues regarding platform compatibility, memory storage capacity and power consumption (Shudong and Higgins 2005).

3.8.4 Learning and Teaching Activities

In a review of the research literature on mobile learning activities Naismith et al. (2004) concluded that mobile learning can be used to provide learning and teaching activities in the following six broad theory-based categories:

1. Behaviourist learning – learning activities that bring about a modification in a learner’s observable behaviour

2. Constructivist learning – learning activities in which a learner actively construct new ideas or knowledge based on both their previous knowledge

3. Situated learning– learning activities that promote learning within an authentic context and culture
3. Mobile Technology in Education – Background and Literature Review

4. Collaborative learning – learning activities that promote learning through social interaction and group working

5. Informal and lifelong learning – activities that support learning outside a dedicated learning environment and formal curriculum

6. Learning and teaching support – activities that assist in the coordination of learners and resources for learning activities

This thesis is primarily concerned with the sixth category, that of learning and teaching support using mobile text messaging to provide an out-of-class communication channel between instructors and students. The effect of this on student perception of their relationship with their instructor and the quality of communication between them is investigated.

3.8.5 Classification of Mobile Learning Systems

There are various classifications of mobile learning systems in the current research literature. These classifications generally concern the type of mobile devices supported, the wireless communication technologies used, the type of access to the required information and the type of information that is accessed. Mobile learning systems have been classified according to their general characteristics, as listed below and illustrated in the Figure 3.4 (Georgieva et al. 2005):

1. The type of mobile device and wireless technology used
2. Whether the communication between learners and instructors is synchronous or asynchronous

3. Whether the information accessed by learners is learning material or administrative information, or both

4. Whether the system is on-line, that is there is a permanent connection between the mobile device and the system, or the system is off-line, for example the learning materials are uploaded, or the system is both on-line and off-line

5. Depending on the location of the users the system can be on-campus, off-campus or both

6. The type of e-Learning specifications and standards supported if any

Figure 3.4 A general classification of mobile learning systems (from Georgieva et al. 2005 – modified)
As this thesis is primarily concerned with the use of text messaging to enhance communication between instructors and students the mode of communication of interest is asynchronous, the location is both on-campus and off-campus, the mobile technology of concern is SMS, whether it is supported by a second-generation mobile system (GSM) or a third-generation system (3G). The mobile device used by the vast majority of students is a second-generation or third-generation mobile phone. Text messaging was chosen for a number of reasons, for many students it is a highly familiar medium, it is relatively inexpensive and is widely used. Synchronous communication using Instant Messaging (IM) and asynchronous communication using email were also considered for use but these technologies are not as widely available on mobile phones as text messaging and they do not support the ‘anytime anywhere’ property of communication that is required.

**3.8.6 Text Messaging in Education**

Text messaging has been exploited for supporting learning in a variety of educational settings. Studies of third-level students have shown that text messaging is used more regularly by students than email and is often students’ preferred way for receiving information from their institution (Harley 2007). However, because a text message is limited to only 160 characters it is more suitable for certain types of learning activities than others.

A review of the current research literature shows that the ways in which text messaging has been employed in education fall generally into four categories. The
first category is when it is used to support and enhance classroom interactivity and dialogue. The second category is when it is used for administrative purposes such as notifications of changes in the timetable and reminders of assessment submission dates. The third category is when it is used as a means of supporting micro-teaching activities including the sending of short summaries for revision, the sending of links to a relevant page on a Virtual Learning Environment (VLE) and also the provision of quizzes and feedback to students. The final category is when it is used not for learning purposes directly but rather to guide, motivate and support students, encourage participation and engagement, and promote collaboration and co-operation. This fourth category includes many examples where it is used to enhance student affective learning, develop a sense of community amongst students and positively affect student retention rates (Trifonova 2007; Harley 2007). The fourth category may include messages from some of the other categories but the key difference is that the primary goal of the text messaging is to support students and enhance affective learning. As this thesis is concerned with the effect of text messaging on the communications between instructors and students and on student perception of instructor immediacy it is this final category that is of primary interest to this research.

3.8.6.1 Text Messaging to enhance Classroom Interaction

There are many examples in the research literature of the use of text messaging to support and enhance classroom interactivity and dialogue. The traditional lecture theatre environment is not very conducive to interaction or engagement. Classroom interaction has been shown to promote an active learning environment, provide
greater feedback for instructors, increase student motivation, and enable a learning community (Scornavacca et al. 2007). However, interactive activities have proven to be quite difficult to manage for larger class sizes. The widespread use of text messaging by students offers an opportunity to develop interactive classroom systems and thus enhance the student learning experience (Scornavacca and Marshall 2007).

Classroom feedback systems can effectively enable interaction in large classes. Some positive outcomes of the use of classroom feedback systems include improved understanding of important concepts and increased student engagement and participation. An example of a project that uses a text message-based classroom feedback system is the TXT-2-LRN project by the Victoria University of Wellington in New Zealand. This project is based on the assumption that students have a mobile device (usually a phone) that supports text messaging. The system allows students to send feedback during class to an instructor by sending text messages via the instructor’s mobile phone which is connected to the instructor’s laptop. The system has two distinct modes of operation. The first is called Open-Channel whereby students can send questions or comments using text messaging to the instructor’s laptop without interrupting the class. The second mode is called M-quiz whereby the instructor presents a slide with a question with four possible options. The students then discuss the question and use their mobile devices to indicate which of the options they think is correct. The results appear in real-time on the projector screen (Scornavacca and Marshall 2007).
Survey data collected during a trial of the system showed that in fact 96.8% of students owned a mobile phone that they carried with them and most students (64.9%) sent more than 14 text messages per week. Approximately a quarter of students used the Open-Channel mode to send feedback to an instructor. Students who did not send any feedback indicated the reason why in a survey. Most responded that they had nothing to say, a third gave cost as the main inhibiting factor while a small number believed it to be distracting. However, over 90% felt that the ability to send the instructor feedback using text messaging during class was in one way or other useful. The instructor involved in the trial reported that the quality and quantity of feedback had significantly improved. More than 50% of students responded to at least one M-quiz, significantly higher than for the Open-Channel mode, and 80% of students felt that the M-quizzes were useful (Scornavacca and Marshall 2007).

Some conclusions of the TXT-2-LRN project were that the additional channel of communication in the classroom can be beneficial to students and instructors and that feedback was improved and classes were more interesting and interactive. One of the main issues for adoption of text messaging seemed to be cost of text messages. However, the researchers noted that recent changes in the pricing structures for text messaging, whereby some mobile providers were offering free text messages as part of a package, should increase usage (Scornavacca and Marshall 2007).

While the TXT-2-LRN project identified many advantages of using text messaging for classroom feedback and interaction there may be some restrictions on the use of
mobile phones in some educational institutions and classrooms. This has led to the
creation of an environment for classroom interaction based on the use of PDAs to
emulate SMS text messaging. The messages sent by students are collected in a
database for later analysis and discussion. Messages in the database can be sorted
by sender, receiver, time and scenario. After the messages have been filtered they
can be visually displayed (Bollen et al. 2004; So 2009).

The PLS TXT UR Thoughts project based in Trinity College Dublin used the idea
of interactivity as a message loop starting and finishing with the student. The
project used text messaging as a means of supporting interaction in the classroom
due to the ubiquity of mobile phones among students (Markett et al. 2006). Students
could send text messages to their instructor during class and the instructor
could then view and discuss the messages with the students also during the class,
thus developing the interactive loop. The messages sent were also available on-line
after class allowing students to comment on them and so further develop the
message loop. While the research proved very successful the researchers noted that
it only worked when students brought their phones to class and had credit on them
(Markett et al. 2006). Text messaging has also been used by the Royal College of
Surgeons in Ireland as an alternative to traditional handheld audience response
systems (Clarke and Doody 2008).

3.8.6.2 Text Messaging for Administrative Purposes

Text messaging is used extensively for administrative purposes in many
educational institutions. As mentioned previously it is often students’ preferred
way for receiving information from their institution (Stone 2004; Harley 2007).
Garner et al. (2002) proposed that ‘SMS can be used to interact with people and influence their actions and understandings of situations’ (p.16) and that students welcome text messages that are perceived as timely, appropriate and personalized.

A research experiment at Kingston University in the UK into the use of text messaging for administrative purposes such as changes to schedules, examination dates and places and feedback of student marks concluded that students preferred text messaging as a medium to email or web-based announcements as they felt it was more personal and immediate (Stone 2004). An email to text message service called StudyLink was developed by the University of Birmingham to investigate the feasibility of using this system in a real educational setting for administrative purposes (Naismith 2007). Both students and staff provided input into the design of the system as it was felt that for text messaging to be effective it had to be integrated into both the student and staff experience.

Students in two focus groups who were questioned on the service said they felt that text messaging would be desirable for use in communicating information that was time-sensitive, relevant, unambiguous, selective and trustworthy. They also felt that a volume of 3-5 messages per week was acceptable and that messages should originate from a single contact person known to the students. The results of a trial of the system over a period of two academic terms showed high satisfaction among students with the quantity and content of the text messages. The most common type of message was notices of relevant classes. Administrative staff were able to integrate the service into their work and use it with ease though some reported that they experienced difficulty in composing appropriate text messages (Naismith
3. Mobile Technology in Education – Background and Literature Review

2007). One member of the administrative staff experimented with the informality of the text messages. This has been suggested by Harley (2007) as a means of removing barriers and making the students feel at ease.

Text messaging has also been used in a number of areas in library services to improve them and made them more useful and helpful. These include basic information alerts and renewal and overdue reminders (So 2009).

3.8.6.3 Text Messaging for Micro-Learning Activities

As text messages are limited to 160 characters they are not suitable for sending large amounts of learning material. However, they can be used to support certain types of learning activities, in particular those associated with micro-learning. Micro-learning generally deals with relatively small learning units and short-term learning activities. Text messaging has been used to send students relevant links on a Virtual Learning Environment (VLE) and also to send relevant ‘tips’ on assignments (Stone 2004). Researchers in Massey University in New Zealand developed a prototype m-learning system based on text messaging. The prototype system allows students to respond to quiz questions by sending text messages in predefined format. The prototype supports four types of questions, multiple choice - choose one, multiple response - choose one or more, fill in the blank, and matching of two lists (Tretiakov and Kinshuk 2005).

The possibility of learning languages at any time and at any place is highly desirable for learners and text messaging has proved to be very useful for vocabulary learning. The use of text messaging is not as interrupting or disturbing
to the learning process as other types of media such as audio or video and with text messaging information can be sent to learners at set times and days. Text messaging has been used to conduct English lessons in Japan and second-language learning in Taiwan (So 2009). It has also been used to support the learning of technical words (Cavus and Ibrahim 2009).

When coupled with the web, text messaging has been exploited for the creation of an anonymous collaborative questioning environment (Ng’ambi 2006). One case study describes how students interrogated an academic text and collaboratively asked questions using text messaging. The web interface and text messaging allows students to engage with those whose were off campus through their mobile phones. Another innovative use of text messaging is for game-based learning (So 2009).

So (2009) describes a teaching and learning system based on text messaging that can be used to provide fragments of information to the students and also supports brainstorming activities whereby students can send their ideas from their mobile phones to the system. In addition the system provides a facility for instructors to carry out assessment and supports a variety of question types (So 2009).

### 3.8.6.4 Text Messaging for Out-of-Class Student Support

There are many examples in the research literature where text messaging is not used specifically for the purpose of directly improving academic learning or for administrative purposes but is rather used to support and help students when they are outside class. Such out-of-class (OOC) text messaging may have the aim of enhancing affective learning and improving the learning environment, improving
communications, supporting students’ transition to third-level education, developing a sense of community among students or positively affecting student retention rates.

The potential of the mobile phone as a communications medium in education prompted a research study by Brighton University to explore the use of mobile communication as a way of encouraging a supportive dialogue between students and relevant academic staff. The main motives behind the research were to support students’ transition to third-level education and improve retention. Entrants to third-level education often find themselves in a situation where self-direction and independence in learning is emphasised. This is in contrast with what they experienced at school and can be quite disorientating for many students. It may take some time for them to make the transition to independent learning and during this period there is always a danger that they will not persist in their studies and could end up dropping out. Students who are successful in developing strong friendships and social networks which act as support groups are less likely to drop out (Harley 2007). The emergence of new communication technologies has helped in the formation of these groups, none more so than text messaging. The research study investigated the importance of text messaging and other communication technologies in students’ lives and evaluated the use of a desktop application called Student Messenger that allows university staff to communicate with students using text messages (Harley 2007).

The Student Messenger application was used to send three types of messages. Organisational messages were sent by the school administrator for the entire group
and personal tutors also sent relevant administrative messages to their groups. The student support tutor also occasionally sent general text messages to the entire group reminding them of her role and which usually included a greeting like ‘Hope you have had a good first week’ or ‘Happy New Year!’’. Sometimes messages were sent to individual students who were difficult to contact by other means (Harley 2007). The timing of the messages was carefully planned as was the subject and content of the messages. The support tutor sent messages at certain points in the year when it was felt that students were in most danger of dropping out. In the weeks following the launch of the service students were invited to take part in qualitative interviews. Students who withdrew from the course were asked to take part in exit interviews. Interview questions ranged from introductory questions about students’ transition to university, the different types of communication technologies they used and how they felt about receiving text messages from the Student Messenger application (Harley 2007).

The interviews revealed that text messaging was far more widely used by students than voice calls. The average number of texts sent daily by students was 17 compared with 1.6 voice calls. Students liked the asynchronous nature of text messaging. For contacting others text messaging was the most frequently used communication technologies. Email was predominantly used just for receiving messages but not for sending them. While students were well aware of the costs associated with using the different technologies many availed of free text messaging as part of a package from their mobile provider (Harley 2007).
In terms of student views about receiving text messages from the Student Messenger application most felt that immediate access was a clear advantage over email and other methods of communication. Students also viewed administrative messages as being urgent when received by text message rather than email. The text messages also alerted students to submission deadlines and reminded them of assignments that have to be completed. Students were particularly appreciative of the messages from the support tutor and reported that it ‘gave them a sense of belonging to the university’ (Harley 2007 p.237). The study concluded that careful use of text messaging could strengthen relationships between staff and students, since text messages feel personal in a way that email does not (Harley 2007).

Another very interesting and relevant research study by Griffith University in Australia relates the experience of a female instructor using out-of-class text messaging as a means of staying in touch with her students. The study demonstrates how it can be used as a means of providing connection and a sense of community for first year students and also how it encourages them to persist with their studies. The research is based on the assumption that frequent and meaningful interaction between students and instructors can enhance students’ feeling of being valued, leading to more meaningful engagement with their studies. However, the quality and frequency of interaction is often adversely affected by the fact that students and part-time academic staff are spending less time on campus as a result of busy and complex lives. While the use of email and discussion forums does provide some out-of-class communication, students place a lot of value in personal contact and interaction with their instructors (Horstmanshof 2004).
The ubiquity of mobile phones offers an opportunity of providing personal out-of-class communication between student and instructor that is so important to students. Text messaging in particular is identified as being very suitable for this type of communication as it is “a student centred, personal approach to communication – where connection and communication is viewed from a student’s point of view” (Horstmanshof 2004 p.424). Some of the reasons it was chosen for use in preference to mobile calling are that it is more efficient and time-saving as the messages are asynchronous and they can be dealt with all together at the time of choosing of the recipient. It is also cheaper than mobile calling, especially for the recipient who does not have to spend valuable credit listening to voicemails. In addition text messaging is particularly suited to the 18 to 24 year age group who are most in danger of dropping out of college (Harley 2007; Horstmanshof 2004). Initially students were surprised when informed that they could send text messages to their instructor because the medium was seen as being quite informal. However they soon overcome their initial reluctance and used it as a means of communication with their instructor. Messages received from students included apologies for missing or being late for classes, messages of thanks and requests for meetings to discuss progress and assignments. While not all students made use of the text messaging, they were glad that this service was available to them should they need it at a later stage or in an emergency. While this type of service may give the impression of constant availability, with clear guidelines for use and agreed levels of service, students understand that it is the ability to asynchronously contact their instructor at any time that is on offer and not anytime instant access (Horstmanshof 2004).
3. Mobile Technology in Education – Background and Literature Review

Stone (2004) also partially addresses the issue of student retention through the use of mobile technologies. This research study used a text messaging system as a form of ‘mobile scaffolding’ to support first-year university students. The study advocated a blended approach by using a variety of communication techniques and not to just rely on one technology (Stone 2004, p. 185). The study also highlighted student concerns surrounding issues of security, privacy and trust.

Text messaging has also been used by the University of Ulster in Northern Ireland for supporting first-year chemistry students and for the reduction of student drop-outs. The university send out messages to students of the type ‘Sorry, we missed you today’. The students do not find the messages obtrusive in any way, and actually welcomed them.

3.8.7 Concerns with Text Messaging in Education

While there is much evidence from research studies that the use of text messaging to provide a medium of communication has the potential to be very useful and effective and has many benefits both for students and also for educational institutions, there are also some issues involved that need careful consideration. Perhaps the one that is of most concern is the issue of privacy for students. Mobile phones are very personal and care must be taken to ensure that students are not sent too many text messages or messages that they might feel are inappropriate. For this reason it is very important to have the consent of students before any messages are sent and also ground rules should be negotiated as to the nature, timing and
frequency of messages and also to the confidential nature of the communication (Horstmanshof 2004).

It is very important to have clear guidelines on the use of text messaging for both students and academic staff and these guidelines should be adhered to. Text messaging is very much a ‘push’ technology (Harley 2007) in the sense that the sender decides when to send a message and the message has the potential to be intrusive and unwelcome if guidelines are not followed. It is also very important for a student to be able to withdraw their consent to receiving text messages at any time. This was implemented by Stone (2004) whereby a student could simply send a text message with just the keyword ‘STOP’.

Another issue of concern is that of cost, whether it is to the students or the educational institution (Stone 2004) especially when compared to email which is free at the point of use (Harley 2007). This issue needs to be considered before a text messaging service is made available to students. However more and more students can avail of free text messaging as mobile providers compete for business by providing packages that include text messaging at no extra cost.

Not all academic staff may be comfortable with sending text messages to students and being contactable. The amount and nature of contact and communication between instructor and student is highly dependent on the character and style of the instructor (Harley 2007). Horstmanshof (2004) reported academic staff had expressed concerns that it may increase their workload and that it may lead to dependency on the part of students. However, it can be argued that this type of
support is important to the development of students, especially in terms of affect towards their learning and making them more independent as a result. The communication builds trust between student and instructor and with it there is better chance that small issues will be picked up and dealt with as they happen, before they escalate into bigger problems (Horstmanshof 2004).

### 3.9 Conclusions

Mobile technology has evolved rapidly especially in the last 20 years and has revolutionised the way people communicate. The widespread use of mobile devices, particularly by young people, offers new and exciting possibilities for supporting learning. The accessibility, mobility and pervasiveness properties of mobile technology allow support for learning at any time and in any place. The use of mobile learning, or m-learning, means learning and support for students is no longer confined to the classroom. Text messaging is a key technology that can be exploited for enhancing communication in education as it is virtually instant, location independent and personal. In addition it is relatively inexpensive, convenient and is widely used, especially by young people. The ways in which text messaging is currently used in education fall generally into four categories. To date text messaging has been used in third-level educational institutions primarily for administrative purposes, including library applications. It has also been used for teaching and learning support including classroom interaction, language learning, on-line questioning and other innovative areas.
3. Mobile Technology in Education – Background and Literature Review

Due to its nature text messaging has great potential as a means of providing support for students and as a means of improving communications between students and staff in education institutions. There have been a number of research studies that have demonstrated how text messaging can be used to support students in their transition to third-level education and to develop a sense of belonging. Text messaging can also be used to encourage engagement and aid retention. While the use of text messaging may have many benefits there are also some issues of concern, including privacy, cost and participation by staff members.

There is no doubt that the quality of interaction and communication between staff and students in educational institutions is important. However, the potential for using text messaging to provide a communications channel between faculty and students has not been fully investigated. Such communication may affect student perception of the communication behaviour of their instructor and the quality of their learning environment in general. There is no doubt that open communication can lead to improved learning by students. Because of its nature, text messaging provides a suitable medium for this type of communication.

3.10 Summary

This chapter presented a review of the research literature into the use and role of mobile technologies in supporting education. The chapter began with a brief background to the evolution of mobile technology and its widespread adoption, especially by young people. The phenomenal growth of text messaging was
3. Mobile Technology in Education – Background and Literature Review

described along with its main characteristics. Text messaging has proved to be popular with young people in particular and has become a part of their culture.

Based on the research literature a definition for mobile learning was put forward along with its main characteristics. There are many different teaching and learning activities that are supported by mobile learning but it does have some limitations. Mobile learning systems are generally classified according to their main characteristics. Because of its characteristics, text messaging was identified as being particularly useful for supporting students and their learning. A review of the literature revealed that the uses of text messaging in education fall generally into four categories. The four categories are: to support classroom interaction, for administrative purposes, to support micro-learning activities and to support students themselves. Each of these categories was described and examples from each category were discussed. In addition, some concerns regarding the use of text messaging in education were presented.
4 Preliminary Research Studies

4.1 Overview

Prior to the main research study of this thesis, a number of smaller preliminary research studies were undertaken on the use of mobile technology in education and in particular on the use of mobile text messaging in order to enhance the learning environment for students. These smaller-scale studies greatly enhanced understanding of the ways in which mobile devices could be used to support students and their learning. The findings of the preliminary studies were used to inform the design and implementation of the main research study as will be seen. These studies should be viewed not just in isolation but as a gradual process of investigation and discovery leading toward the development and refinement of the research question for the main research study.

A description of each of the four research studies that were conducted prior to the main study is presented in this chapter. The purpose of each study will be outlined together with an overview of its design and implementation. A discussion of the main findings of each and the conclusions will also be presented. The contribution of each study to the refinement of the main research question for this thesis will be outlined. Many of the findings from these preliminary studies were used to inform the design and implementation of the main research study presented in the next chapter.
The first preliminary study to be carried out was concerned with the perceptions and attitudes of third-level undergraduate students to the use of mobile devices for learning purposes. The success of mobile learning for third-level undergraduate students depends to a great extent on tapping into the enormous affinity between students and their mobile devices (Hayes et al. 2004). This study provided valuable insights into the use of mobile devices by third-level students together with their attitudes towards using mobile devices for learning and their requirements for any future mobile learning systems. One very important finding of this study was that students used text messaging extensively and perceived it as a very useful way of getting information about their course. This had also been evident from the review of the research literature presented in the previous chapter (Stone 2004; Harley 2007).

Based on the findings of the first study it was decided to further explore the use of text messaging as a communications medium for communicating with students. A second study was then initiated, the purpose of which was to investigate the possibility of using text messaging to provide an asynchronous two-way channel for out-of-class communication between instructor and student and also to assess student perception of this form of communication. The findings and conclusions of this study contributed to the development and refinement of the research question for the main study. This second study can in many ways be viewed as a very small-scale pilot study for the main research study. The study highlighted many of the benefits of out-of-class communication between students and instructors using text messaging but it also brought to light some potential concerns that some students may have, including cost and privacy. The findings of the study made clear the
The purpose of the third preliminary research study was to further explore student perception of text messaging as a medium for out-of-class communication with their instructor and in particular to highlight any potential concerns they might have. It was felt that it was very important at an early stage to identify any potential concerns that students may have so that measures could be put in place to address them. The research study was based on interviews with focus groups of students. The students in the focus groups were participants in an out-of-class text messaging service provided by their instructor. The focus groups investigated some potential concerns that students might have the use of text messaging for out-of-class communication with their instructors. In addition the focus groups discussed possible guidelines that should be adhered to. Again the findings contributed to a greater understanding of the use of text messaging for student-instructor communication. Based on consideration of the findings of this research study a set of guidelines was drawn up for the text messaging service. These guidelines were very important in reassuring participants in terms of privacy or any other potential concerns they might have. The guidelines were used in all subsequent text messaging between the instructor and students.

The purpose of the final preliminary study was to obtain feedback from an administrative member of staff who had experience of sending text messages to students on a regular basis. The feedback was revealing in terms of the staff member’s experience with sending the messages and their perception of its
effectiveness or otherwise. The impact of the text messaging on the staff member’s work was also of interest. This study was very interesting as it looked at the sending of text messages from a staff perspective while the other studies had focussed exclusively on the student perspective.

4.2 First Study: Mobile Usage and Perception of Mobile Learning

4.2.1 Purpose and Description of Study

The first of the preliminary studies focussed on ownership of mobile devices by third-level students and their usage of mobile technology. The study also looked at student attitudes towards the use of mobile devices for learning (Relihan et al. 2005). This research study was mainly carried out by a postgraduate student with the collaboration and assistance of the author of this thesis. This study took place in 2005 and, while there is no doubt that student attitudes may have changed somewhat since then, it still provides a valuable insight into the use of mobile technologies by undergraduate students and their attitudes towards using their mobile devices for learning purposes. The study used a questionnaire made up of 37 questions in four different categories, namely device ownership, technology used, usage patterns and perception of mobile learning, to survey the perception of third-level students. The questionnaire that was used for the study can be found in Appendix A. The sample of students surveyed was quite small however and consisted of 37 undergraduate computing students.
4. Preliminary Research Studies

4.2.2 Results and Conclusions

The results of the survey showed that there was extensive usage of mobile devices amongst the students. The ownership of mobile devices was extremely high among the group with 97% of the students surveyed owning at least one mobile device and 29% reporting that they owned more than one. The students had spent considerable amounts of money on their devices, primarily in the initial purchase of the device but also in regularly sending text and multimedia messages, downloading files and making phone calls amongst other things. Over one-third of students spent between €10 and €20 each week on their mobile device. Over half of the group also said that they would purchase a new mobile device in the near future.

The study revealed how students used their mobile devices extensively for many different purposes and how they were open to using their devices for mobile learning, which they viewed as a feasible method to meet learning objectives. When the students were asked their opinions about how mobile technology could be used in supporting learning 86% reported that they felt that text message reminders regarding assignments would be useful while 72% reported that collaboration between students via mobile devices would be beneficial to their learning. Three-quarters of the students thought that access to lecture notes from a mobile device would be useful while 56% of the group added that access to audio files of lectures would aid their studies. These findings were very encouraging and gave great impetus to the research work at the time.

Text messaging was a highly used feature of the devices with over 90% of students reporting that they sent more than 15 text messages per week while almost one-
third reported that they sent over 50 text messages per week. The vast majority of messages were sent for social reasons with less than 10% related to their studies. These findings showed clearly that students used their mobile devices extensively and spent considerable money on them. They also revealed how much students used mobile text messaging as a means of communication and it was felt that if this text messaging could be somehow harnessed for education it could be highly beneficial. As the study had highlighted students’ extensive use of text messaging and their openness to using it in supporting learning it was decided to further investigate the use of text messaging to improve the quality of the learning environment for students. This led on to the second study which looked at using text messaging to support out-of-class communication between instructors and students with the aim of supporting students and enhancing the learning environment.

4.3 Second Study: Use of Text Messaging for Instructor-Student OOC Communication

4.3.1 Purpose and Description of Study

The second study focussed on the use of text messaging for out-of-class (OOC) communication (Hayes et al. 2006a). The purpose of the study was to provide an asynchronous two-way communication channel between instructor and student using text messaging for out-of-class student support and also to evaluate the effectiveness of such communication from a student perspective and their attitude toward it. This study was in many respects a pilot-study for the main research study but was much simpler in structure, had a much smaller number of participants
(N=18) and also lacked the rigorous planning and design of the main study. The instructor who took part in the study was also the sole researcher.

It was decided to offer a mobile text messaging service to a group of students to allow them to communicate outside of class with one of their male instructors with the aim of supporting them and their learning. The group of students that were offered the service were a class of second year students who were doing a higher certificate in computing. The instructor who offered the service was delivering an introductory module on data communications and networking to the group. The text messaging service that was provided was viewed as a short-term scheme that, if successful, could be made available to other classes.

Those students who volunteered to participate in the study were given the number of a mobile phone that was permanently connected to their instructor’s laptop and they were invited for a period of 6 weeks to send text messages to this mobile number if they wished when they were outside of class and they also consented to receiving text messages from their instructor from this mobile phone. For the purpose of the study it was made clear that all communication between instructor and student would be treated in strictest confidence and the participants consented to the data collected from the study being used anonymously at a later date for research purposes. Before any messages were sent participants were asked to sign a consent form.

The instructor was able to send messages to participants from an application on the laptop and view any messages received from the students. The application is called
MyPhoneExplorer and can be downloaded free on the Internet. It operates much like an email program but uses text messages instead of emails. Great care was exercised by the instructor in terms of the content and nature of the text messages sent as well as their timing and frequency. The messages sent to the students were of three main categories. The first category was messages for course administrative purposes such as class announcements and reminders of assignment submission dates. The second category was content-related messages such as multiple-choice questions and short summaries on what had been covered previously in class. The final category was messages to promote affective learning, student motivation and interest and to encourage attendance, engagement and participation such as announcing the topics of the forthcoming lectures or thanking students for their participation in class. While most of the messages sent by the instructor were broadcast in nature, that is sent to every participant, if any participant wished they could respond to any of the messages and engage the instructor in a dialogue. They were also free to send a message to the instructor whenever they wished and engage in a dialogue. The students were constantly reminded that they could withdraw their consent to receiving text messages at any time by informing their instructor but no student did.

4.3.2 Results and Conclusions

At the end of the six week period the participants were surveyed anonymously about their perception of the effectiveness of the service and their attitudes towards it (Hayes et al. 2006a). The participants were asked 11 questions about the service and were asked to respond to each on a 5-point Likert scale. The feedback from the
students was very revealing and the responses of the participants are summarised in
Table 4.1 below. Note that the students refer to their instructor as their lecturer.

Table 4.1 Results of Survey on Out-of-Class Text Messaging Service. Participants were asked to rate their responses on 5-point Likert scale where 1=definitely not and 5= very much so. N = 18.

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you think receiving text messages from your lecturer is a good idea?</td>
<td>3.7</td>
</tr>
<tr>
<td>2</td>
<td>Do you think that sending and receiving text messages has increased your motivation?</td>
<td>3.0</td>
</tr>
<tr>
<td>3</td>
<td>The mobile phone can be used anytime and anywhere to send and receive messages. Do you think that this has a positive effect on your motivation?</td>
<td>3.3</td>
</tr>
<tr>
<td>4</td>
<td>Do you think that sending/receiving text messaging is an effective approach to supporting learning?</td>
<td>4.1</td>
</tr>
<tr>
<td>5</td>
<td>Have the text messages helped you in your learning?</td>
<td>3.2</td>
</tr>
<tr>
<td>6</td>
<td>Do you think you respond better to the text messages than you would to emails?</td>
<td>3.0</td>
</tr>
<tr>
<td>7</td>
<td>Do you think the features of a mobile phone (eg. size and type of the display) is sufficient to support learning?</td>
<td>3.3</td>
</tr>
<tr>
<td>8</td>
<td>Do you think text messaging is useful for the organisational side of learning such as announcements about room changes etc.?</td>
<td>4.6</td>
</tr>
<tr>
<td>9</td>
<td>Do you think the text messaging has improved your relationship with the lecturer?</td>
<td>3.6</td>
</tr>
<tr>
<td>10</td>
<td>Are you concerned about the potential cost of replying to the text messages?</td>
<td>2.2</td>
</tr>
<tr>
<td>11</td>
<td>Do you feel that receiving text messages from your lecturer is intrusive?</td>
<td>2.0</td>
</tr>
</tbody>
</table>

In addition participants were also given the opportunity in a feedback session of expressing their views as to the advantages and drawbacks of such a service (Hayes et al. 2006b). In summary, some of the advantages of the text messaging, as identified by the participants in the feedback session, were as follows:
• Very useful to inform students of class changes or cancellations – this would be beneficial to both students and lecturers no matter how big or small the class size.

• It makes the lecturer more accessible and approachable, therefore easier for students to ask for help if they are struggling or seeking clarification on topics already covered.

• Good to let students know of topics to be covered in upcoming lectures.

• Could be used to summarise lectures or note important points to remember.

• Helps consolidate knowledge by asking questions to get students thinking about what they have just learned and remember it.

• Helps to motivate students and remind them of assignments/homework to be done.

• Useful to recommend extra reading or websites for further information.

• Could be helpful around exam time by texting little quizzes for students as a revision aid.

• Builds rapport between lecturers and students.

Some of the drawbacks to the text messaging service, as reported by the students, were as follows:
4. Preliminary Research Studies

- Possibly not suitable for large class groups or universities as there are too many students so it would be time consuming and costly for the lecturer to send information in the first place or reply to every text.

- Restricted to the type and amount of information that can be sent over text as a text message has a limited character amount.

- May be more suitable to some subjects and levels of education than others. It depends on what kind of information is to be sent, to how many people and if a response is necessary.

- The amount of courses a student has must be taken into consideration as to how many text messages they can receive from each lecturer and how often.

- There may be issues regarding privacy for the students.

In summary, the participants generally perceived the out-of-class text messaging service as an effective approach to supporting learning. They also perceived that it could improve their relationship with their instructor and they did not think the messages were too intrusive. It was concluded that such a text messaging service could be beneficial for some students, especially those in small groups. The study had also brought to light some potential concerns that some students may have about communicating with their instructor using text messaging and it was decided to further explore these. The findings of the research study were of immense significance and relevance to the main study. This was because, ultimately, consideration of student perception of the usefulness of text messaging and their
perception of its effect on the communication behaviour of their instructor would provide the research question for this thesis.

4.4 Third Study: Guidelines for Text Messaging

4.4.1 Purpose and Description of Study

Following on from the second study it was decided to make the service available throughout the following semester for three more classes on a trial basis and to continue to investigate its effectiveness and any potential concerns participants may have with using it. The second study had highlighted some potential concerns and to allay these concerns it was felt that a set guidelines was required for the use of text messaging for out-of-class communication between instructors and students. It was decided to further explore the need for guidelines by using a number of focus groups made up of volunteer students who were using the service. The purpose of the focus groups was to elicit student feedback on their perception of the text messaging and in particular with regard to any potential concerns they might have. From a review of research literature and feedback from students an appreciation was developed of the personal nature of text messaging, as perceived by students, and the importance of respecting personal boundaries. Therefore, it was very important to capture student feedback in terms of any potential concerns they might have and what they perceived as appropriate in terms of the subject and content of text messages as well as their frequency and timing. To this end a series of questions was put to the focus groups about what they perceived as being appropriate in terms of the text messaging service and they were also asked for
their recommendations. This was done with a view to producing a set of guidelines to be used for all further communication.

There were three focus groups formed from three different classes, each group was made up of between four and six volunteers. Two of the focus groups comprised of volunteers from two classes of second-year full-time undergraduate computing students. The average age of these students was 21. A third focus group comprised of volunteers from a class of mature third-year part-time undergraduate students. These part-time students attended classes two evenings a week and on Saturdays and their average age was 28. The interviewer was the instructor who was providing the text messaging service to the students.

The responses of the students to the questions that were put to them by the interviewer and any other discussions that took place during the focus group sessions were recorded and transcribed. In this case the interviewer was the instructor who was making the text messaging service available to them. For the main research study all interviews with participants were anonymous and were carried out by a person other than the instructor who was making the service available.

**4.4.2 Discussion and Conclusions**

The interviews with the focus groups were very revealing and the feedback gathered was very valuable in understanding student perception of the text messaging service and any potential concerns they may have about it. The
transcripts of the interviews with the three focus groups transcripts can be found in Appendix B. In general the students perceived the service as being very useful and helpful. However a few areas of potential concern were highlighted in the focus group discussions. This was viewed as very positive for the research as it was felt that it was very important to identify potential student concerns as early as possible and to consider measures that could be put in place to address them.

In general the participants in the focus groups perceived the text messaging as a good idea, particularly when a class was cancelled at short notice or a reminder was sent about a forthcoming test or assignment deadline. The ability to contact the instructor when studying for a test and to request that extra course notes be made available at short notice were also perceived as being advantages. Some also perceived that it encouraged more interaction and made the instructor more approachable. This was a very important finding in terms of the development of the research question for the main research study. It also supported the finding of the second preliminary study that participants felt that the text messaging helps to builds rapport between them and their instructor.

The participants reported that they were initially surprised when the instructor offered them the service as this was the first instructor to have done. While some reported that they felt under a little pressure to sign up initially, none reported that they did not like receiving the messages. Some of the participants felt that other instructors should offer a similar service. The fact that some felt under pressure to sign up for the service was taken very seriously even though it had been made clear to the students that it was totally up to themselves if they wished to participate or
not and there was absolutely no penalty for not participating. It was felt that it was very important to further emphasise this and a decision was made that all future participants would have to read and sign a detailed consent form before availing of the service. The consent form should explicitly state that participation was purely voluntary and there were no risks involved to the participant. The consent form should also make it clear that participants had the right to withdraw their consent at anytime or refuse to participate entirely without jeopardy to their relationship with the instructor and their class status, grade or standing with the college. In addition the consent form should outline the level of confidentiality and anonymity that participants could expect.

The participants generally reported that they found the text messages relevant, appropriate and not annoying or obtrusive in any way. While most agreed that the messages should be related to their learning, one student felt that occasional messages such as “have a nice weekend” could help to improve communication. A decision was made based on the general feedback that all messages sent to participants should be related to their learning. However the messages were not strictly limited to course administration and micro-learning activities. Occasional text messages could also be sent to student with the aim of motivating and encouraging them in their studies, enhancing affective learning and letting them know that help was available should they require it. While this type of message was generally welcomed by students it was decide that messages of this type should only be sent as a broadcast to every participant in a class and not to any individual participant or group, unless it was send as part of a dialogue with an individual that was on-going. One of the main reasons for this was to avoid any perception of
favouritism on the part of students. While the text messages could be somewhat informal in the language used it was felt that it was important that they should not be too personal in nature. While the text messaging may blur the perceived boundaries of the instructor-student relationship somewhat it is always very important for the instructor to constantly keep their role in mind, even if some students do not.

The participants did not report any concerns about the cost of the text messages. There is no charge in Ireland for receiving text messages, unlike some countries, and the participants reported that they did not have to send any messages if they did not wish to and many were able to send free text messages in any case as part of their mobile subscription plan. In terms of the frequency with which the instructor sent text messages, most participants felt that four or five per week was acceptable and but that it should not exceed eight or nine. Others felt that about two per week was sufficient. Some also mentioned that there was no limit to the number that could be sent in a dialogue with an individual student. It was decided based on this feedback that no more than four messages should be broadcast by the instructor to the participants per week.

In terms of the timing of the messages the participants felt that they should not be sent late in the evening, no later than 8pm or 9pm on a weekday was mentioned. The participants also mentioned that care should to be taken so as not to send them a text message while they were in class as this could disturb their study. They also did not want messages too early in the morning unless it was very important and would prefer to get these messages if possible the evening before. However, they
did not seem to have any concerns about receiving text messages during the weekend. Based on this feedback it was decided that text messages should only be sent between 9am and 7pm on a weekday for all students and on Saturdays from 9am to 1pm only for the part-time students who had classes that day. Only in circumstances such as a 9am class being cancelled at very short notice should a text message be sent before 9am and preferably this type of message should be sent the evening before. As the texting service was for out-of-class use, the instructor should check the class schedules to determine that participants were not in class before sending a message. The students in turn should not read or send any messages while they were in class.

Based on consideration of the feedback from the student focus groups and reflections by the instructor on the appropriateness and effectiveness of the text messaging for communicating with students a set of guidelines were drawn up for all further use of the text messaging service. The guidelines are outlined below.

**Guidelines for Operation of Out-of-Class Text Messaging Service**

**Guideline 1.** Participants should read and sign a consent form prior to using the service. The consent form should outline clearly that participation is wholly voluntary and can be terminated at any time. In addition the consent form should make clear the levels of confidentiality and anonymity that participants can expect, both in terms of their contact details and any messages they send or receive.
4. Preliminary Research Studies

**Guideline 2.** The consent form should make it clear that there are no risks to students who do not participate and participants can withdraw their consent at anytime or refuse to participate entirely without jeopardy to their relationship with the instructor and class status, grade or standing with the college.

**Guideline 3.** If a participant decides to withdraw their consent at any stage they should do so by informing the instructor in writing, by email or by simply sending a text message with the keyword STOP. Once they have informed the instructor their contact details and any messages they sent/received should be removed from the system.

**Guideline 4.** The service should be available during term-time only and at the end of the teaching term participants should be informed that the service is being terminated.

**Guideline 5.** The instructor should endeavour to respond to a question or a request from a participant sent by text message within four working hours, if possible, and not more than two working days.

**Guideline 6.** The messages sent by the instructor should be related to learning and may include messages designed to motivate and encourage students with their studies. However, such messages should be sent as a broadcast to all participants in a class and should not be sent to just one individual or group of individuals unless as part of an on-going dialogue.
4. Preliminary Research Studies

**Guideline 7.** All important/official information should also be sent to all students in a class via other channels such as email and class announcements. Therefore any important course information sent via text message will be redundant as it will also be available to students through other channels.

**Guideline 8.** No more than four text messages per week should be sent as a broadcast to any class. However, this does not apply when the instructor is engaged in a dialogue with an individual participant.

**Guideline 9.** Text messages should only be sent between 9am and 8pm on a weekday. Text messages may be sent on Saturdays from 9am to 1pm to part-time students only. Text messages may be sent before 9am only in exceptional circumstances such as the cancellation of a 9am class at very short notice.

**Guideline 10.** The messages may be informal but should be related to the students’ learning and should not be too personal in nature.

**Guideline 11.** No messages should be sent by the instructor to individual students or to any group of students on the day prior to or the day of class tests, examinations or assignment submission deadlines.

**Guideline 12.** Messages should not be sent while participants are in class. Participants should not read or send text messages while in class.
This preliminary research study provided valuable information about good practice in terms of instructor-student communication using text messaging. Any subsequent communication via text messaging with students used the guidelines that were developed as a result of this study. In this way the outcomes of this research study were used to inform the design and implementation of the main research study. The feedback from the focus groups was very positive in terms of the text messaging service and some participants had perceived that it encouraged more interaction and made the instructor seem more approachable. This was a very important finding in terms of the development of the research question for the main research study.

4.5 Fourth Study: Experience of Sending Text Messaging for Administrative Purposes

4.5.1 Purpose and Description of Study

The previous three preliminary studies had revealed much about student perception of the use of text messaging to support their learning. In particular the feedback given by students regarding an out-of-class text messaging service that allowed them to communicate with their instructor was very informative. It was felt that it would also be beneficial to get feedback from a staff standpoint. To this end it was decided to interview a member of staff who had experience of sending text messages to students on a regular basis.

The programme co-ordinator of one of the department of the college where the research was conducted agreed to be interviewed about the operation of a new text
messaging service called XIAM which had been introduced in 2008. The XIAM system allows companies to send tailored and personalised text messages to clients and makes use of a user-friendly web-based graphical user interface. The system is used by the college for purely for administrative purposes and allows the programme co-ordinator to send text messages to a class of students to announce any changes to schedules at short notice, for example if a class has to be postponed to a later date. Messages are not sent to individual students. The purpose of the interview was to explore the perceptions of the staff member towards the operation of the text messaging service. The impact of the service on the workload and work practises of the staff member was also investigated.

4.5.2 Discussion and Conclusions

The interview with programme co-ordinator took place on 20th February 2009 and a transcript of the interview can be found in Appendix C. This interview is very revealing about the attitudes and opinions of a member of staff who sends text messages to students on a regular basis, albeit purely for administrative purposes and always as a broadcast. The text messaging system was introduced “partly in response to feedback from the Student Services Survey” and also “as a response from the College need to improve communication channels”. Student demand for text messaging services, coupled with a desire on the part of the institution to improve communication, was the main driving forces behind the adoption of the text messaging system.
When asked about the introduction of the system the programme co-ordinator responded “I was delighted with it because it saves a lot of work for myself”. When asked if her attitude towards the system had changed since its introduction and if she felt uncomfortable using it she replied, “the more I use it the more user-friendly I find it” and “as I said before it has made my life a lot easier, made my work a lot easier and made me work more efficiently”. Obviously the system has been beneficial to the work of the programme co-ordinator.

The only concern the programme co-ordinator had with the system was that a few students had reported that they had not received some of the text messages but the programme co-ordinator reported that she “never got any negative feedback saying ‘Please don’t send me a text’ or ‘I don’t want to get a text’”. When asked if the text messaging had changed her relationship in any way with the students she responded “I suppose they would because they know my name and they know my function”, because “I would never send a text message without me signing off as myself”. Even though the text messages were not personal in nature and were used purely for administrative purposes they were welcome by the students and they got to know the person sending the messages. Perhaps this was because the programme co-ordinator was the only member of staff sending text messages to classes apart from the classes participating in the text messaging service made available by the instructor. While the text messages sent by the programme co-ordinator were purely administrative and not personal in nature the fact that text messaging was been used could have lead to students forming their own perceptions and conclusions about the communication behaviour of the staff member.
4. Preliminary Research Studies

4.6 Summary

This chapter has described four research studies that were conducted prior to the main research study. These four preliminary studies contributed greatly to the understanding of the research area and they also provided valuable input into the design and implementation of the main study. The studies can also be viewed as a gradual process of investigation and discovery leading toward the development and refinement of the research question for the main study. The purpose and design of each of the preliminary studies was described as were the main results and findings. In addition, any conclusions drawn were also discussed. The first preliminary study was concerned with the perceptions and attitudes of third-level undergraduate students to the use of mobile devices for learning purposes. Text messaging was highlighted as a possible means of communicating with students. The second study investigated the possibility of using text messaging to provide an asynchronous two-way channel for out-of-class communication between instructor and student and also to assess student perception of this form of communication. The study highlighted many of the benefits of out-of-class communication between students and instructors using text messaging but it also brought to light some potential concerns that some students may have, including cost and privacy. A third study looked at these concerns in greater depth using interviews with student focus groups. Based on consideration of the feedback from these interviews and reflection on the use of text messaging for instructor-student out-of-class communication a set of guidelines was drawn up for all future text messaging. The final preliminary study was also very revealing as it examined the sending of administrative text messages to students from the perspective of a staff member.
5 Methodology

5.1 Overview

This chapter is concerned with the main research question of the thesis and the methodology that was used to investigate it. The research question for the main study is outlined and an explanation is provided for how it was developed and refined. As this research is interdisciplinary in nature, intersecting the fields of instructional communication and mobile learning, the review of research literature from both field, presented in chapters two and three, contributed to the formulation of the main research question. In addition, the findings of the preliminary research studies were also instrumental in enhancing understanding of the research area and also to the development and refinement of the research question.

The methodology that was used to investigate the research question is also outlined. The design and implementation of a rigorous experimental study based in a real educational setting is described. The purpose of the study was to gather empirical evidence in regard to the effect of text messaging on perceived instructor immediacy. The study was quite large with over one hundred participants and the experimental procedure and treatment phase alone took one full academic year to complete. The study was designed in such a way as to allow the effect of the variable of interest to be isolated from the effects of other variables during the measurement process. The experimental procedure that was used for the study is
outlined as are the methods used for the collection of both quantitative and qualitative data. The treatment of the participants in terms of consent, anonymity and confidentiality is also discussed.

5.2 Research Question

The review of the research literature on mobile learning, presented in Chapter 3, suggests that frequent and meaningful communication using text messaging between instructors and students can improve communications between them and also enhance students’ feeling of being valued, leading to more meaningful engagement with their studies (Harley 2007; Horstmanshof 2004). The findings of the preliminary research studies, outlined in the previous chapter, revealed that some students perceived that communicating with their instructor by text messaging had made the instructor seem more approachable. Some students also perceived that the text messaging improved communications and helped to build rapport with their instructor. These findings were very interesting from a research perspective as they tied in with findings from research studies in the area of instructional communication that suggest that student perception of the communications behaviour of their instructor was very important in terms of student learning and their perception of their learning environment (Christensen and Menzel 1998; Pogue and Ahyun 2006; Witt and Wheless 2001). Based on the findings of both the preliminary research studies and the literature review on mobile learning it was decided to further investigate the effects of using out-of-class text messaging as a means of enhancing communication between instructor and student.
One very important factor in terms of the effective communication between instructors and students is student perception of instructor immediacy. Instructor immediacy has attracted a great deal of attention recently from researchers in the field of instructional communication (Freitas et al. 1998) and according to Witt (2004) no other construct has received more attention during recent times. The research literature on instructional communication, presented in Chapter 2, reveals that research studies suggest that instructor immediacy is central to the learning process for students and can positively affect them and their perception of the quality of their learning experience (Christensen and Menzel 1998; Pogue and Ahyun 2006; Witt and Wheeless 2001). The research studies also suggest that enhanced instructor immediacy enhances student affinity for the instructor, course and subject matter (Andersen 1979) and is linked to more positive instructor-student relationships engendering positive attitudes, increased interest and motivation by students (Christensen and Menzel, 1998; Christophel, 1990; Ellis 2004). In addition the research literature on instructional communication also reveals positive relationships between student perception of instructor immediacy and the following factors: attendance, retention, student engagement, classroom behaviour as well as student satisfaction (Allen et al 2006; Kearney et al 1985; Rocca 2004a; Witt et al 2004).

The research literature on instructional communication makes a strong case for the view that student perception of instructor immediacy is very important not just in terms of the effectiveness of the communication between instructor and student but also in the learning process for students. The preliminary research studies and the
literature review on mobile learning suggest that text messaging could be used as a means of enhancing communication between instructor and student. Taking these two together, this poses the question of what effect, if any, text messaging between instructor and student may have on student perception of the immediacy of their instructor. It was felt that this was a very important question to answer because if it could be demonstrated that out-of-class text messaging between instructor and student enhanced student perception of instructor immediacy than it could be reasonably argued, based on existing research literature, that this type of communication is very beneficial in terms of the learning process for students and their perception of the learning environment. There has been very little research work done to date in either the fields of instructional communication or mobile learning on the use of technology to support out-of-class communication between instructors and students. For that reason it was felt that an investigation of this might be of interest to others and could potentially make an important contribution to existing knowledge in both fields.

Therefore the goal of this doctoral research project was to investigate the effect of text messaging between instructor and student on student perception of the immediacy of their instructor. The research made use of text messaging to provide students with increased availability to their instructor by providing an extra channel for out-of-class asynchronous communication. As outlined in the review on mobile learning in Chapter 3, text messaging has many characteristics that make it suitable for this type of communication, including the fact that it is personal, easy to use, cheap, asynchronous and ubiquitous. The research question that this thesis is concerned with can be stated clearly and explicitly as follows:
What is the effect of the use of mobile text messaging for out-of-class communication between instructor and student on student perception of instructor immediacy?

5.3 Research Study

5.3.1 Introduction

An empirical study was designed to explore the research question of the impact of out-of-class communication between instructors and students using text messaging on student perception of instructor immediacy. The research study was based in a real educational setting and its goal was to measure the effects the out-of-class text messaging on perceived instructor immediacy. Measuring immediacy effects in real educational settings is a complex task as many other factors that may influence immediacy are also at play. Immediacy may depend on factors that are not under the instructor’s control such as duration of exposure, subject domain, student status (part-time versus full-time) and class size. The question really was if an observable effect on student perception of instructor immediacy could be attributed to the text messaging and not other factors. For this reason the experimental design of the main study had to be done carefully and also had to be elaborate and rigorous enough so that other factors could be isolated from the effect of the text messaging on student perception of instructor immediacy. In terms of research variables the text messaging was treated as the independent variable while instructor immediacy was treated as the dependent variable. The other factors were mostly moderating
variables. The experiment used a number of standardised instruments to measure student perception of instructor immediacy. The measurements yielded a considerable amount of quantitative data on levels of perceived instructor immediacy by students. While analysis of this quantitative data addressed the central research question of this thesis it was decided that it would be useful to also look at student perception of the use of the text messaging service and its impact on their learning experience. Therefore students who used the service were asked to complete a questionnaire about their perceptions of using the text messaging service and its impact. The questionnaire consisted of two sections, the first section was used to gather quantitative data on student perception of the use of the text messaging service and the second section gathered qualitative data by asking students for their opinions on the impact of the text messaging service on their learning experience using open questions.

5.3.2 Experimental Design

In total 102 participants took part in this study. The participants were all third-level undergraduate computing students who were taking between five and six modules each semester. One of the modules each participant was taking each semester was either a module in databases or a module in data communications. These modules were all delivered by the same instructor. The researcher who was conducting the study was also the instructor who was delivering the eight modules. The sampling method used was convenience sampling as is often the case in educational research of this kind. A review of educational research literature shows that it is often extremely difficult (even sometimes impossible) to select either a random or
systematic non-random sample of students for study, often due to issues of access. At such times a researcher may use convenience sampling or purposeful sampling, which is based on personal judgement (Fraenkel and Wallen 2006). When using quasi-experimental research in education the recommendation is to clearly identify the limitations, discuss the equivalence of the groups and argue logically as to the representativeness of the samples used and the generalisability of the findings (Wiersma and Jurs 2005). As convenience sampling was used for this study it is acknowledged that there are issues as to the generalisability of the results. This is a recognized limitation and is discussed in more detail in the chapter on conclusions and future perspectives. Based on discussions with senior researchers it was estimated that a sample of 102 subjects was sufficient for the purposes of the study, given the restrictions of the experimental design and the need for treatment and control groups. Other research studies that investigate immediacy may use larger sample sizes but they use much different experimental designs.

The research experiment itself took two semesters to complete, which is equivalent to one full academic year. The experiment began at the start of the second semester of the 2006-2007 academic year and finished at the end of the first semester of the following academic year. The participants in the study were from eight different classes, four classes of full-time students and four classes of part-time students. Five of the eight classes acted as treatment groups for the study and these classes were offered the use of a text messaging service for out-of-class communication with their instructor. The other three classes operated as control groups to allow for comparison of the effects on instructor immediacy. Table 5.1 illustrates a categorisation of the groups that participated in the main study.
Table 5.1 Categorisation of groups participating in the study

<table>
<thead>
<tr>
<th></th>
<th>Full-time</th>
<th>Part-time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment group</strong></td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

It was felt that, to ensure validity, student perception of instructor immediacy had to be studied in a real educational setting and so it was not desirable to use an artificial laboratory-style controlled experiment. This was also the case for many other research studies that had investigated instructor immediacy. These studies used real classrooms and this introduced its own challenges with measurement (Richmond et al. 1987).

Therefore it was decided that the study would use real classrooms in a real educational setting and so the design of the study was quasi-experimental. From a practical point of view the instructor who operated the text messaging service delivered four modules each semester to four different classes. The use of eight different classes for the study across two semesters allowed for the effect of text messaging on immediacy to be isolated as much as possible from other factors that are known to impact on immediacy. The use of different classes also allowed for comparison of immediacy levels across different subject domains as well as for status of student. The length of time the participants were exposed to the text messaging was also of interest to the research. For some classes the text messaging service was available for one semester while for others it was available for two semesters. To add to the complexity of the design some of the classes had previously been taught by the instructor and so the design had to take account of this factor as well as this could also have an effect on perceived immediacy. After
5. Methodology

careful consideration of the many factors involved that could impact on student perception of instructor immediacy and the practical limitations of measuring immediacy in a real educational setting, the design process yielded the following arrangement of treatment and control groups, as shown in Figure 5.1, based on the eight classes that the instructor taught during a full academic year.

![Figure 5.1 Structure of groups used for main study](image)

The instructor delivered four modules each semester to four different classes. During the first semester of the study the instructor delivered a module on data communications to a class of full-time students studying in year 2 of a programme called the Higher Certificate in Computing. The instructor also delivered a similar module to a class of full-time students and a class of part-time students studying in year 3 of a programme called the Honours Degree in Computing. In addition, the
instructor delivered a module on databases to a class of part-time students studying in year two of the Honours Degree in Computing. All four classes had been taught by the instructor previously except for the class of full-time students studying in year two of the degree. It was decided to use two of these four classes as treatment groups and two as control groups.

The third-year part-time degree class and the second-year full-time degree class were chosen as treatment groups C and D respectively. The students in these classes were to be offered the use of a text messaging service for out-of-class communication with their instructor. To allow for comparison of results and isolation of factors contributing to immediacy the second-year higher certificate class and the second-year part-time degree class were chosen as control groups A and B, respectively. For the purposes of the research study students in these classes were not to be offered the use of the text messaging service at this time. At the end of the semester the level of perceived instructor immediacy by the participants in all groups was measured using standardised scales. In addition as the participants in group A, who were from the second-year higher certificate class, had completed their course and would not be taking any further part in the research study, they were asked to complete a questionnaire anonymously about their perceptions of the text messaging service and its impact on their learning experience.

The following semester, the instructor delivered four more modules. The full-time students from second-year of the honours degree (group D) progressed into third-year where they took a further module of data communications and became group H for the purposes of the study. The part-time students from second-year of the
honours degree (group B) also progressed into third-year of the degree where they took a module on data communication and became group G for the purposes of the study. In addition, the instructor delivered a module on data communication to a class of students in second-year of the higher certificate, who became group E, and also a module on databases to a class of part-time students in second-year of the honours degree, who became group F. The choice of treatment and control groups was then made so as to maximise the opportunity for comparison and isolation of factors and effects. After much consideration it was decided to use groups E, G and H as treatment groups and group F as a control group. Thus, in total for the experiment there were five treatment groups and three control groups. This would allow for the isolation and comparison of the effects of text messaging on perceived instructor immediacy from other factors such as subject, student status and previous exposure to instructor. At the end of the second semester the level of perceived instructor immediacy in all groups was again measured using standardised scales. In addition as the experiment was now complete, the participants in the treatment groups (E, G and H) were asked to complete a questionnaire anonymously about their perceptions of the text messaging service and its impact on their learning experience.

5.3.3 Single-Blind Experimental Procedure

For the purposes of this study a single-blind experimental procedure was used in so far as the participants were not aware of the goal of the experiment or the research question. This was very important because if the participants knew the goal of the experiment there was a danger that they could introduce intentional or
unintentional bias into the results. The experiment was not however fully double-blind as the instructor was aware of the goal of the research study. However the instructor took every precaution to ensure the participants, who were all students of the instructor, were not made aware of the goal of the research. In addition great care was taken by the instructor so as not to introduce any unintentional bias into the experiment. As far as the instructor was concerned the purpose of the out-of-class text messaging service was to simply support students and their studies. The instructor did not treat the students in the treatment groups any differently than the students in the control groups. For example, all students received the same teaching as well as lecture notes, handouts, tutorial exercises and assessments irrespective of the group they were in. The instructor had delivered these modules for many years and so the delivery was quite standardised. The only difference in the way the groups were treated was that the treatment groups had the use of a text messaging service.

As far as the participants in the treatment groups were aware they were simply trialling an out-of-class text messaging service that had been made available to them by their instructor. At the start of the semester the participants had signed consent forms to take part in the text messaging service and at the end of the semester they were asked to sign consent forms to take part in the research study and complete some anonymous research questionnaires. Participants in the control groups were not asked to do anything except to voluntary sign consent forms at the end of the semester and anonymous complete some questionnaires. At no point during the experiment was the possible impact of the text messaging service on
student perception of the communication behaviour of their instructor, or perceived instructor immediacy, mentioned or discussed with the participants.

5.3.4 Experimental Treatment

This section outlines the treatment that participants in the treatment groups received. There were five treatment groups in total and participants in these groups received the treatment for a full academic semester which was 13 weeks in duration. As participants in treatment group D progressed after the first semester of the treatment from year 2 to year 3 of their course and became treatment group H, in total they received 26 weeks of treatment. Their levels of perceived immediacy were measured at the end of both semesters and it was very useful for comparison purposes.

5.3.4.1 Text Messaging Application

As stated previously the treatment given to the treatment groups was the availability and use of a text messaging service for out-of-class communication with one of their instructors for the duration of the semester. The text messaging service offered was very much like the one used for the second and third preliminary research studies outlined in the previous chapter. The instructor used a freeware application called MyPhoneExplorer that was installed on the instructor’s laptop together with a mobile phone that was connected to a USB port on the laptop. The model of phone used for the experiment was the Sony Ericsson 800i. This mobile phone was purchased specifically for use with the out-of-class text messaging service. The instructor had another mobile phone for personal use. The
software application on the laptop was very versatile and easy to use. In terms of
text messaging it operated much like an email program allowing the creation,
viewing, editing and deletion of text messages as well as the sending and received
text messages via the connected mobile phone. The application could be
synchronised with the mobile phone allowing access from the laptop to both the
SIM and phone memory. During synchronisation contact details of participants and
text messages sent and received could be copied automatically from the phone to
the application and visa versa. The application allowed the sending of text
messages to individuals or groups and it also supported the archiving of text
messages on the laptop. In summary, the application maintained a list of contact
details for participants and was very useful for the provision and operation of a text
messaging service for out-of-class communication between participants in the
treatment groups and the instructor. A screenshot of the user interface of the
MyPhoneExplorer application is shown in Figure 5.2 below.
5. Methodology

5.3.4.2 Categories of Text Messages

The types of messages sent to participants by the instructor were very similar to the types sent during the second and third preliminary research studies. As stated previously the primary purpose of all messages sent was to support students and their studies and to enhance affective learning. It was felt that for the purposes of the study it was important that the information in the text messages should be redundant, that is it should also be sent by other channels to all students in a class and not just those who had volunteered to participate in the text messaging service. Therefore whenever a text message of this type was sent, an email with the same content was also sent to every student in the class. Great care was exercised by the instructor in terms of the content and nature of the text messages sent as well as their timing and frequency. While it was difficult to categorise some of the messages they generally fell into one or more of three main categories. The first category was for messages that were sent for administrative purposes. The vast majority of these messages were sent as broadcasts to all participants in a treatment group. Only very rarely was there a need to send a message of this type to an individual participant or subgroup of participants. Examples of the use of this type of message include class announcements and cancellations, and reminders of class tests and assignment submission dates. A few examples of text messages of this category that were sent to participants were as follows:

“Hi, I have put the final marks for your continuous assessment up on Moodle. Paul”

“Don’t forget you have a test on databases this Friday!”
5. Methodology

“Just to remind you that John from BT Ireland is coming in to gave us a talk next Tuesday. Paul”

“Hi, DCN class is postponed tomorrow, I have to attend an important meeting, will make it up to you. Paul”

The second category was for text messages that were specifically related to the topics covered in a module that were being delivered by the instructor and the contents of these messages were supplementary to the course material. These messages were sent as broadcasts to all participants and were used for the purpose of micro-learning activities. The messages included short summaries for revision purposes, short or multiple-choice questions and advice on how to prepare for forthcoming classes. Each message was restricted to 160 characters so the messages had to be short and precise. In the case of a text message containing a short question or a multiple-choice question the correct answer was sent as a broadcast text messages to all participants after a suitable period of time. A few examples of text messages in this category that were sent to participants were as follows:

“What is the name of each layer of the OSI network model?”

“What does the letter ‘S’ stand for in the acronym ISDN? Answer (a) Signals (b) Services (c) Switching or (d) Segment?”
“Do you have any questions on what we covered today in class?”

“The lecture next week is on the topic of DSL. Please look over the lecture notes on this topic prior to coming to class. Thanks”

The third category of message were those whose main purpose was to promote affective learning and included messages that were designed to motivate students in their studies, enhance interest in the subject and to encourage attendance, engagement and participation in class. While messages from the other two categories could have an indirect affect on affective learning this type of message was specifically aimed at enhancing it and included messages expressing pleasure at the effort students were putting into their studies and thanking students for their participation in class. These messages were always sent as a broadcast to all participants and care was exercised to make sure they were always positive in tone and never critical. A few examples of text messages in this category that were sent to participants were as follows:

“Thanks for all your work and study this week. Glad to hear the projects are getting off to a good start. Have a good one & c u nxt week, Paul”

“You learn something everyday if you pay attention ~~ Ray LeBlond”

“Very enjoyable class today. I will try to sort out the issue with the timetable tomorrow. Paul”
5. Methodology

5.3.4.3 Guidelines on Sending and Receiving Messages

The third preliminary study had produced a set of guidelines for operation of the out-of-class text messaging service. These guidelines were observed as strictly as possible during the main study. The participants in the treatment groups were informed of the guidelines at the start and they were also informed that any serious misuse of the service could result in the service to them being terminated. The guidelines used for the out-of-class text messaging between the instructor and the participants in the treatment groups can be found in Section 4.4.2.

5.3.5 Methods of Data Collection

At the end of each of the two 13 week semesters the level of perceived instructor immediacy was measured anonymously for participants in both the treatment groups and the control groups using two standardised immediacy measurement instruments. The quantitative measurement data that were gathered allowed for the comparison of levels of perceived immediacy across both treatment and control groups. The two instruments used to measure the perceived instructor immediacy were the Generalised Immediacy (GI) scale (Andersen 1979) and the Perceived Nonverbal Immediacy Behaviors (PNIB) scale (McCroskey et al. 1996). In addition to these two standardised scales, at the end of the treatment period participants in the treatment groups were asked to anonymously complete a questionnaire about their perceptions of the text messaging service and its effects. These data were both quantitative and qualitative and was very revealing in terms
of student perception of the use of text messaging for out-of-class communication with their instructor and its impact on their learning experience.

5.3.5.1 Generalised Immediacy (GI) Scale

The Generalised Immediacy (GI) scale is a high-inference instrument as it measures a general or gestalt impression of an individual’s overall level of immediacy (Andersen 1979; Witt et al. 2004). The GI scale is typically used in education to measure a student’s perception of the overall immediacy level of their instructor. The GI scale presents students with a short paragraph defining the immediacy construct both conceptually and behaviourally. After reading the paragraph students are then asked to rate their own instructor’s level of immediacy by responding to two sets of semantic differential types of scales. The GI scale consists of nine items in total each rated on a 7-point Likert-type bi-polar continuum (Witt et al. 2004). A number of research studies have consistently confirmed a single-factor solution with all items loading on the first unrotated factor (Andersen 1979; Kearney et al. 1985; Plax et al. 1986). Therefore the responses by students to the nine items on the GI scale can be summed (Rubin et al. 2004). The Generalised Immediacy (GI) scale used for the main research study is not presented in this thesis due to copyright restrictions. However, it can be viewed in Andersen (1979) and Rubin et al. (2004). It normally takes less than five minutes for students to complete.

For the purposes of scoring each item the position of a tick corresponds to a score with a tick in a box on the very left corresponding to a score of 1, a tick in a second left-most box corresponding to a score of 2 and so on. A tick in a right-most box
corresponds to a score of 7. This is the case for all items except items one, six and nine. These items are reversed prior to scoring. When all items have been scored the scores for the nine items are summed together to give one overall score for each student (Rubin et al. 2004).

In terms of reliability, estimates for the scale are always high, between .84 and .97 (Andersen 1979; Kearney et al. 1985; Plax et al. 1986). Test-retest correlation was .81 (Andersen et al. 1979). In terms of validating the scale, Andersen (1979) asked students who had already completed the GI scales based on their overall impressions of their instructors’ immediacy to also complete another scale where they reported their instructors’ specific immediacy behaviours. The correlation between the second instrument, the Behavioral Indicants of Immediacy (BII) scale, and the GI scale was found to be .67. When actual observers were used instead of students to rate the same instructors’ immediacy behaviour the correlation between the two instruments was .80 (Andersen 1979, McCroskey and Richmond 1992). The GI scale also correlates highly with other affective variables, including students’ affective learning (Andersen 1979; Andersen et al. 1981, Kearney et al. 1985; Plax et al. 1986) and instructor/student affinity (Andersen 1979).

5.3.5.2 Perceived Nonverbal Immediacy Behaviors (PNIB) Scale

The second instrument that was used to measure student perception of instructor immediacy was the Perceived Nonverbal Immediacy Behaviours (PNIB) scale developed by McCroskey et al. (1996). The PNIB scale is a specific low-inference measure of the construct of instructor immediacy. It uses a 10-item scale and is a revised version of the 15-item Nonverbal Immediacy Behaviours (NIB) developed
by Richmond et al. (1987) (McCroskey et al. 1996, Witt et al. 2004). The Nonverbal Immediacy Behaviours (NIB) scale itself was a slightly modified version of Anderson’s (1979) original BII scale.

The NIB scale is composed of low-inference items relating to specific instructor immediacy behaviours and has a reference base that is consistent for all students, regardless of subject being studied or the culture of the student (McCroskey et al. 1996). The scale measures perceived non-verbal behaviours that an instructor might use while teaching in front of the class including eye contact, gestures, open-body position and movement (Rubin et al. 2004). The student is asked to indicate which of the five options best describes the frequency at which the instructor exhibits the behaviour: never, rarely, occasionally, often or very often (Richmond et al. 1987; McCroskey et al. 1996). The scale normally takes less than 5 minutes to complete (Rubin et al. 2004).

The scale has been found to be reliable when used by either teachers or students (Christophel 1990; Gorham 1988; Richmond et al. 1987). The concurrent validity of the NIB scale has been supported by numerous studies (Christophel 1990; Gorham 1988; Gorham & Zakahi 1990; Richmond et al. 1987). In terms of construct validity many research studies support a moderate to substantial relationship between the NIB scale and affective and/or cognitive learning (Christophel 1990; Gorham 1988; Gorham & Zakahi 1990; Richmond et al. 1987). The NIB scale was revised by McCroskey et al. (1996) as examination of available data sets found that items relating to touch and sitting or standing while teaching were poor (Rubin et al. 2004). The data indicated that college instructors from the four different cultures covered in the studies virtually never touched their students.
In addition neither sitting nor standing was found to be a reliable predictor of an instructor’s immediacy. It was found that elimination of these items would increase or have no impact on the reliability of the instrument (McCroskey et al. 1996), hence they were eliminated to produce a revised instrument called the Perceived Nonverbal Immediacy Behaviours (PNIB) scale. The PNIB scale that was used for the main study is not presented in this thesis due to copyright restrictions. However it can be viewed in McCroskey et al. (1996) and Rubin et al. (2004).

The student completes the PNIB scale by putting a score beside each item. When the scale is completed by the student the scores for the ten items are summed to give an overall score. However items two, five and seven are non-immediate items and so the scores for these items are reversed prior to summation i.e. 0 becomes 5, 1 becomes 4 etc.

The decision of whether to use a high-inference or a low-inference instrument is based on several factors. Infrequent interface with an instructor or data based on recall may require the use of a high-inference instrument while the training of specific immediacy behaviours or evaluation of the contribution of each behaviour may require the use of a low-inference instrument (Rubin et al. 2004). For the purposes of this research study it was decided to use both a high-inference instrument and a low-inference instrument to measure student perception of instructor immediacy, the high-inference instrument being the Generalised Immediacy (GI) scale and low-inference instrument being the Perceived Nonverbal Immediacy Behaviours (PNIB) scale.
5. Methodology

5.3.5.3 Student Perception of Text Messaging Service

The GI scale and the PNIB scale would provide a measure of student perception of instructor immediacy level for participants in both the treatment groups and the control groups. However, to obtain a better understanding of student attitudes and perceptions of the use of the text messaging service and its impact, if any, on their learning experience it was decided to ask the participants in the treatment groups to anonymously complete a comprehensive questionnaire at the end of the treatment period. The questions were formulated based on a review of the research literature on the use of text messaging to support students together with a review the findings of the preliminary studies and the use of the text messaging service to provide out-of-class support to students during the main study. The first section of the questionnaire consists of 30 specific questions about student perception of the use and impact of the text messaging service. Participants were asked to indicate their response to each question on a 7-point Likert scale. The second section of the questionnaire uses a series of open questions to give participants the opportunity of anonymously expressing their personal opinions in terms of communicating with their instructor using text messaging and its impact, if any, on them or their class in terms of learning and education, and the relationship with their instructor. The questionnaire was completed by participants in group C at the end of the first 13-week semester of the study and by participants in groups E, G and H at the end of the second 13-week semester of the study. The participants in group H had also been given the 13-week treatment while they were in group D during the first semester of the study. The questionnaire on student perception of the use and impact of the text messaging service that was used for the main study can be found in Appendix D.
5. Methodology

5.3.6 Consent, Confidentiality and Anonymity

The principle of informed consent was used throughout the research study. Every student who took any part in the research was informed beforehand of what was involved, why they were been asked to participate, the potential benefits or risks of being involved and also the level of confidentiality they could expect. After being informed they were asked to acknowledge their consent by signing a consent form. The consent forms detailed all the information the student needed to know in advance before giving their consent. The level of confidentiality and anonymity granted to students who consented to take part in the research study was also viewed as being very important.

Before any student could participate in the text messaging service they had to read and sign a consent form. This was in keeping with the guidelines that had been formulated by the third preliminary study for all future operation of the service. The complete set of guidelines for the operation of the service can be found in Section 4.4.2 and the pertinent ones in terms of confidentiality and anonymity are listed below.

**Guideline 1.** Participants should read and sign a consent form prior to using the service. The consent form should outline clearly that participation is wholly voluntary and can be terminated at any time. In addition the consent form should make clear the levels of confidentiality and anonymity that participants can expect, both in terms of their contact details and any messages they send or receive.
Guideline 2. The consent form should make it clear that there are no risks to students who do not participate and participants can withdraw their consent at anytime or refuse to participate entirely without jeopardy to their relationship with the instructor and class status, grade or standing with the college.

Guideline 3. If a participant decides to withdraw their consent at any stage they should do so by informing the instructor in writing, by email or by simply sending a text message with the keyword STOP. Once they have informed the instructor their contact details and any messages they sent/received should be removed from the system.

To participate in the service the students in the classes assigned as the treatment groups needed to complete and sign a consent form. The consent form basically outlined the purpose of the service and what was involved on the part of the student and any potential benefits or risks that might be involved. The consent form used for participation in the text messaging service can be found in Appendix E.1. The consent forms were given to the students along with copies of the guidelines for use of the text messaging service. The guidelines can be found in Section 4.4.2. The students were required to read the guidelines prior to signing the consent forms. Shortly after signing the consent form the participants received their first text message from their instructor welcoming them to the service.

At the end of each semester participants in all four groups were asked to complete the two immediacy measurement instruments. In addition, participants in the treatment groups were asked to complete a questionnaire about their perception of
the service and its impact. Before being asked to complete the immediacy instruments or the questionnaire the participants were asked to read and sign a consent form to take part in the research study. The consent form completed by participants in the treatment groups can be found in Appendix E.2 while the consent form completed by participants in the control groups can be found in Appendix E.3.

It was decided that the two immediacy measurement instruments and the questionnaire should be completed anonymously by the participants. However, for the purposes of the study it was desirable to collate the responses of participants to the different forms and also to compare the responses of some participants across semesters. To facilitate this while still maintaining anonymity the participants were asked to invent codenames for themselves and use these codenames instead of their real names throughout the study when filling out forms and questionnaires. The instructor was not aware of the codename that were used by the students. Thus, the use of codenames allowed the responses for individual participants to be collated and even compared across semesters while still maintaining anonymity.

5.4 Summary

This chapter began by outlining the research question for the main study and described how the question was developed and refined from the literature reviews on instructional communication and on mobile learning and from the findings of the preliminary research studies. A research study was designed and implemented to isolate the effect on instructor immediacy of the use of text messaging from
other factors that may impact it. The need to measure immediacy in a real educational setting meant that a quasi-experimental design was necessary. The study involved over a hundred participants from eight different classes and took place over a full academic year. The experimental procedure used was single-blind meaning that the students in both the treatment and control groups were unaware of the research question that was being investigated while the instructor was. However great care was exercised to ensure that bias was not introduced into the study. A text messaging service for out-of-class communication was made available to participants in the treatment groups. At the end of each semester participants were asked to rate their perceptions of the immediacy of their instructor on two immediacy measurement instruments. In addition participants in the treatment groups were asked to complete a questionnaire about their perceptions of the use and impact of the text messaging service at the end of the treatment period. Informed consent was sought from participants prior to their participation and levels of confidentiality and anonymity were also addressed.
6 Results and Discussion

6.1 Overview

The purpose of the main study was to explore the research question by gathering empirical data as evidence to explore what effect, if any, the use of text messaging for out-of-class communication between instructor and student has on student perception of instructor immediacy. The results of the main study are presented and discussed in this chapter. Included in the results are the levels of participation by students in the study and an analysis of the numbers of text messages that were sent and received. Quantitative data from the two instruments used to measure perceived instructor immediacy is statistical analysed to reveal if there was any significant difference between immediacy levels in the treatment groups and the control groups. The effect on the perceived instructor immediacy of other factors such as previous exposure to the instructor and the status of students is also considered from a statistical perspective. Quantitative and qualitative data is presented from student responses to the questionnaire on student perception of the use of the text messaging service and its impact on their learning experience. The responses by students to the open questions in the questionnaire are especially revealing as they contain many references to the effect of text messaging on their learning experience and their perception of the immediacy of their instructor.
6. Results and Discussion

6.2 Levels of Participation

In total 102 students from eight different classes volunteered to participate in the main study. These eight classes made up the eight groups for the study. For the purposes of the study five of the eight groups acted as treatment groups while the other three operated as control groups to allow for comparison of the effects. Four of the groups were made up of full-time students and the other four groups were made up of part-time students. Generally the full-time classes were larger in size than the part-time classes. In total 68 full-time students and 34 part-time students participated in the study. The average age of the full-time students was 22 while the average age of the part-time students was 30. A breakdown of the participants in each group can be seen in Table 6.1.

The participants were all third-level undergraduate computing students who were taking between five and six modules each semester. One of the modules each participant was taking was delivered by the same male instructor who was carrying out the research. As the computing classes were predominantly made up of male students the participants in the study were also predominantly male. In total there were 92 male participants and 10 female participants. Participation in the study was purely voluntary and the rates of participation by students in the different groups were very high. The number of students from each class who signed the consent form and participated in the study is shown in Table 6.2. Every student in classes that were assigned as control groups volunteered to take part in the study except for two students who were not in attendance when the consent forms were completed and signed. The participation rate for part-time students for both the treatment and
control groups was 100%. The participation rate of the 2006/2007 second-year degree class in treatment Group D was 79.2%. This was due to the fact that some students were poor attenders and so missed the opportunity to take part in the study. In addition, one student left the course to take up a job and another refused to participate as he claimed to have received nuisance calls in the past. The participation rate of the 2007/2008 second-year higher certificate class in treatment Group E was 80%. One student refused to take part in treatment Group E saying he did not agree with students being close to instructors, another was out sick for nearly the entire semester and a third felt that class time was the only suitable time for communicating with an instructor. The overall rate of participation for the study was 90.4%. The overall rate of participation for the treatment groups was 85.1% and for the control groups it was 94.9%. None of the participants who had given their consent to take part in the text messaging service or the research study subsequently withdrew it.

Table 6.1 Numbers of participants for each group in the study

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of Group</th>
<th>Student Status</th>
<th>No. of Participants</th>
<th>Average Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Control</td>
<td>Full-time</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>B</td>
<td>Control</td>
<td>Part-time</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>C</td>
<td>Treatment</td>
<td>Part-time</td>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>D</td>
<td>Treatment</td>
<td>Full-time</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>E</td>
<td>Treatment</td>
<td>Full-time</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>F</td>
<td>Control</td>
<td>Part-time</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>G</td>
<td>Treatment</td>
<td>Part-time</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>H</td>
<td>Treatment</td>
<td>Full-time</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>All Groups</td>
<td>Full-time</td>
<td>68</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>All Groups</td>
<td>Part-time</td>
<td>34</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>Treatment Groups</td>
<td>Both</td>
<td>63</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>Control Groups</td>
<td>Both</td>
<td>39</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>All Groups</td>
<td>Both</td>
<td>102</td>
<td>25</td>
</tr>
</tbody>
</table>
### 6. Results and Discussion

#### Table 6.2 Rates of participation for each class involved in the study

<table>
<thead>
<tr>
<th>Class</th>
<th>Status</th>
<th>No. Of Students</th>
<th>Group</th>
<th>No. Of Parts.</th>
<th>Participation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic Year 2006/2007</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Certificate Year 2</td>
<td>FT</td>
<td>24</td>
<td>A</td>
<td>22</td>
<td>91.7%</td>
</tr>
<tr>
<td>Degree Year 2</td>
<td>PT</td>
<td>9</td>
<td>B</td>
<td>9</td>
<td>100%</td>
</tr>
<tr>
<td>Degree Year 3</td>
<td>PT</td>
<td>6</td>
<td>C</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>Degree Year 2</td>
<td>FT</td>
<td>24</td>
<td>D</td>
<td>19</td>
<td>79.2%</td>
</tr>
<tr>
<td><strong>Academic Year 2007/2008</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Certificate Year 2</td>
<td>FT</td>
<td>15</td>
<td>E</td>
<td>12</td>
<td>80%</td>
</tr>
<tr>
<td>Degree Year 2</td>
<td>PT</td>
<td>8</td>
<td>F</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td>Degree Year 3</td>
<td>PT</td>
<td>11</td>
<td>G</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td>Degree Year 3</td>
<td>FT</td>
<td>18</td>
<td>H</td>
<td>15</td>
<td>83.3%</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td>115</td>
<td>102</td>
<td></td>
<td>88.7%</td>
</tr>
</tbody>
</table>

#### 6.3 Analysis of Messages Sent/Received

This section presents an analysis of the text messages sent and received by the instructor during the study. The text messaging service was made available to participants in each of the treatment groups for a period of 13-weeks, or one full teaching semester. The fact that none of the participants in the treatment groups withdrew their consent to the service would suggest that the messages were generally well received and appreciated. At the end of the treatment period participants were asked to express their opinions in free form comment in response to open questions about the use and impact of the text messaging service. The students generally evaluated the service positively and several students expressed their appreciation of the service. Some students even suggested that the service should be extended to other modules. A few comments by students in the treatment...
groups to the open question about the use and impact of the text messaging service are listed below:

“Feel communication is very high-level. Good service to students who are not great at one-to-one meetings or in front of class.”

“I think it’s a very good idea”

“Text message service should be used with all lectures”

“I think text messaging should be applied to all modules”.

During the study a total of 283 messages were sent out to students in the five treatment groups, 156 of them were broadcast messages sent to entire groups and 127 messages were sent to individual students in response to individual queries. This shows that many students not only received messages but actively participated in the communication. Table 6.3 below details the number of messages sent by the instructor to participants in each of the treatment groups and the numbers messages received from participants in each group.

<table>
<thead>
<tr>
<th>Table 6.3 Number of messages sent and received during study by treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Group</strong></td>
</tr>
<tr>
<td><strong>Student Status</strong></td>
</tr>
<tr>
<td>Sent to Individuals</td>
</tr>
<tr>
<td>Sent to Entire Group</td>
</tr>
<tr>
<td>Total Sent by Instructor</td>
</tr>
<tr>
<td>Received by Instructor</td>
</tr>
<tr>
<td>Received/Sent Ratio</td>
</tr>
<tr>
<td>Received by Students</td>
</tr>
</tbody>
</table>
The number of messages sent and the ratio of received messages to sent messages was highest for groups D and E. Both these groups were made up of second-year full-time students studying an introductory module to data communications. Group H had the lowest ratio of received messages to sent messages. This group was made up of student who had progressed from second year to year three of the degree course and these students were already familiar with the subject. In the previous semester these participants had taken part in the study as Group D. The participants in treatment Group G had also taken part in the study during the previous semesters as control Group B. The total number of messages sent by the instructor during two 13-week semesters of the study was 283. The number of broadcast messages sent to every participant in a group was 156 while 127 messages were sent to individual participants usually in response to individual queries. A total of 243 messages were received by the instructor from participants indicating that participants not only received text messages but actively participated in the communication. Between broadcast messages and individual messages the total number of individual messages received by all participants during the study was 1,770. This means that on average 28 messages were sent to each of the participants in the treatment groups and it equates to an average of just over two messages per participant per week.

Even though 283 texts were sent by the instructor during the main study the cost of sending the messages was not prohibitive. The instructor was able to send a lot of the broadcast text messages for free using a text messaging service provided via the website of the mobile provider. In addition the instructor had free text messaging to any students who were using the same mobile provider as himself and most of
these students could also reply to him if they wished at no cost. The estimated average cost of the service to the instructor was less than two euro per week.

6.4 Results from Immediacy Instruments

Instructor immediacy was measured at the end of each semester for all participants in the study using two standardised measurement instruments. The first instrument used was the generalised immediacy (GI) scale (Andersen 1979) which is a high-inference instrument that measures a gestalt or overall level of perceived instructor immediacy (Rubin et al. 2004). The second instrument used was the perceived nonverbal immediacy behaviors (PNIB) scale (McCroskey et al. 1996) which is a low-inference measure of the construct of instructor immediacy (Rubin et al. 2004). At the end of each of the two 13-week semesters participants in both the treatment and control groups was asked to complete the two scales. A total of 98 participants completed the GI scale while a total of 99 participants completed the PNIB scale. A few participants from control Group A who had signed consent forms to take part in the study were absent when the forms containing the scales were completed. Subsequent efforts to contact the students and get them to complete the forms were not successful.

In order to explore the effect of text messaging on the participants’ perception of instructor immediacy the mean values for each group, as measured using both scales, were compared. Table 6.4 below shows descriptive statistics for the immediacy measurements using the GI scale while Table 6.5 shows descriptive statistics from the measurements using the PNIB scale. The two tables also include...
the 95% confidence intervals meaning that there is 95% confidence that the mean values in the overall population lie between the lower and upper figures. As a quasi-experimental design was used in the main study there are recognised limitations to the generalisability of the results. Therefore analysis of the data focuses on comparison of the means and variance of the measured immediacy for the different groups. Statistical analysis demonstrates clearly with a very small probability of error that there is a significant difference between the means of the treatment and control groups. The generalisability of the findings is discussed in the next chapter.

Table 6.4 Descriptive Statistics for Immediacy Measurements using the GI scale

<table>
<thead>
<tr>
<th>Student Status</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
<th>Confidence Interval (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-Time</td>
<td>No text</td>
<td>45.0</td>
<td>6.37</td>
<td>17</td>
<td>42.0 - 48.5</td>
</tr>
<tr>
<td></td>
<td>Group C</td>
<td>50.8</td>
<td>5.23</td>
<td>6</td>
<td>46.6 - 54.9</td>
</tr>
<tr>
<td></td>
<td>Group G</td>
<td>50.7</td>
<td>9.10</td>
<td>11</td>
<td>45.3 - 55.4</td>
</tr>
<tr>
<td></td>
<td>Texts (C &amp; G)</td>
<td>50.8</td>
<td>7.77</td>
<td>17</td>
<td>47.1 - 54.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>47.9</td>
<td>7.58</td>
<td>34</td>
<td>45.3 - 51.1</td>
</tr>
<tr>
<td>Full-Time</td>
<td>No Text</td>
<td>46.0</td>
<td>11.56</td>
<td>18</td>
<td>40.7 - 50.7</td>
</tr>
<tr>
<td></td>
<td>Group D</td>
<td>53.3</td>
<td>6.76</td>
<td>19</td>
<td>50.2 - 56.8</td>
</tr>
<tr>
<td></td>
<td>Group E</td>
<td>50.2</td>
<td>10.80</td>
<td>12</td>
<td>44.1 - 55.2</td>
</tr>
<tr>
<td></td>
<td>Group H</td>
<td>53.3</td>
<td>11.18</td>
<td>15</td>
<td>47.7 - 58.2</td>
</tr>
<tr>
<td></td>
<td>Texts (D, E &amp; H)</td>
<td>52.5</td>
<td>9.36</td>
<td>46</td>
<td>49.8 - 55.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>51.2</td>
<td>10.04</td>
<td>62</td>
<td>48.1 - 53.9</td>
</tr>
<tr>
<td>Total</td>
<td>No Text</td>
<td>45.5</td>
<td>9.28</td>
<td>35</td>
<td>42.4 - 49.0</td>
</tr>
<tr>
<td></td>
<td>Texts</td>
<td>52.0</td>
<td>8.93</td>
<td>63</td>
<td>49.8 - 55.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49.7</td>
<td>9.54</td>
<td>98</td>
<td>47.8 - 52.6</td>
</tr>
</tbody>
</table>
Table 6.5 Descriptive Statistics for Immediacy Measurements using the PNIB scale

<table>
<thead>
<tr>
<th>Student Status</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
<th>Confidence Interval (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-Time</td>
<td>No Text</td>
<td>26.5</td>
<td>4.00</td>
<td>17</td>
<td>24.6 to 29.5</td>
</tr>
<tr>
<td></td>
<td>Group C</td>
<td>29.0</td>
<td>3.52</td>
<td>6</td>
<td>26.2 to 32.4</td>
</tr>
<tr>
<td></td>
<td>Group G</td>
<td>28.6</td>
<td>5.26</td>
<td>11</td>
<td>25.4 to 32.1</td>
</tr>
<tr>
<td></td>
<td>Texts (C &amp; G)</td>
<td>28.7</td>
<td>4.61</td>
<td>17</td>
<td>26.5 to 31.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>27.6</td>
<td>4.39</td>
<td>34</td>
<td>26.1 to 30.3</td>
</tr>
<tr>
<td>Full-Time</td>
<td>No Text</td>
<td>28.5</td>
<td>4.77</td>
<td>19</td>
<td>26.4 to 31.6</td>
</tr>
<tr>
<td></td>
<td>Group D</td>
<td>30.3</td>
<td>3.35</td>
<td>19</td>
<td>28.8 to 33.0</td>
</tr>
<tr>
<td></td>
<td>Group E</td>
<td>30.0</td>
<td>3.41</td>
<td>12</td>
<td>28.1 to 32.9</td>
</tr>
<tr>
<td></td>
<td>Group H</td>
<td>31.1</td>
<td>3.42</td>
<td>15</td>
<td>29.4 to 34.0</td>
</tr>
<tr>
<td></td>
<td>Texts (D, E &amp; H)</td>
<td>30.5</td>
<td>3.35</td>
<td>46</td>
<td>29.5 to 33.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30.2</td>
<td>3.48</td>
<td>62</td>
<td>29.0 to 32.4</td>
</tr>
<tr>
<td>Total</td>
<td>Non text</td>
<td>27.6</td>
<td>4.49</td>
<td>36</td>
<td>26.1 to 30.3</td>
</tr>
<tr>
<td></td>
<td>Texts</td>
<td>30.0</td>
<td>3.77</td>
<td>63</td>
<td>29.1 to 32.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29.34</td>
<td>4.01</td>
<td>99</td>
<td>24.6 to 29.5</td>
</tr>
</tbody>
</table>

If text messaging enhances perceived immediacy it would be expected that the mean values for the treatment groups would be greater than that of the control groups. This was indeed the case as can be seen in Tables 6.4 and 6.5 above. A 2-factor ANCOVA of text messaging and student status on the GI scale measurements shows that the means are significantly higher (F=9.50; p=.027) for the treatment groups, irrespective of student status, see Figure 6.1 below. The treatment groups perceived the instructor as significantly more immediate than the control groups. This effect is consistent across all treatment groups. The measurements using the GI scale show that participants in the treatment groups perceived their instructor as being on average 9% to 16% more immediate than participants in the control groups.
6. Results and Discussion

A 2-factor ANCOVA of text messaging and student status on the PNIB scale measurements also shows that the means are significantly higher (F=11.40; p=.001) for the treatment groups, irrespective of student status, see Figure 6.2 below. The treatment groups perceived the instructor as significantly more immediate than the control groups. This effect is also consistent across all treatment groups. The measurements using the PNIB scale show that participants in the treatment groups perceived their instructor as being on average 8% to 9% more immediate than participants in the control groups.
It was expected that student status and previous exposure to the instructor might have an effect on perceived immediacy. In order to control for these two factors, the number of semesters of previous exposure was included in the ANCOVA analysis as covariate and student status was treated as an additional factor. The analysis of the measurements using the two instruments demonstrates that neither status nor previous exposure can explain the observed differences in immediacy between the treatment groups and the control groups, as shown in Tables 6.6 and 6.7. While part-time students have a lower measurement of perceived immediacy on average, there is no significant difference between the groups. An interaction effect was also not observed. The treatment effect on the GI scale measurements is considered to be very large ($\eta^2 = .655$), while the effect on the PNIB scale measurements seems to be smaller in comparison ($\eta^2 = .108$), but is still considered to be a large effect. The correlation between the measurements from the two scales is reasonably good ($r = .40, p<.01$).

The lower measurement of immediacy among part-time students may be explained by the fact that they have considerably less face-to-face teaching time with the instructor than the full-time students. In addition, as the average age of the part-time students is 30 compared with 22 for the full-time students it may also indicate that the younger students are more willing to use their mobile devices for communication with their instructor.
Table 6.6 Results of ANCOVA showing effect of duration of previous exposure to instructor (covariate), status of student (full-time vs. part-time) and text messaging on General Immediacy (GI) scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>264.2</td>
<td>.004</td>
<td></td>
</tr>
<tr>
<td>Previous Exposure</td>
<td>1</td>
<td>.8</td>
<td>.387</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>1</td>
<td>4.6</td>
<td>.641</td>
<td></td>
</tr>
<tr>
<td>Text Messaging</td>
<td>1</td>
<td>9.5</td>
<td>.027</td>
<td>.655</td>
</tr>
<tr>
<td>Status * Text Messaging</td>
<td>1</td>
<td>.2</td>
<td>.628</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.7 Results of ANCOVA showing effect of duration of previous exposure to instructor (covariate), status of student (full-time vs. part-time) and text messaging on Perceived Nonverbal Immediacy Behaviors Scale (PNIB)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>360.5</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Previous Exposure</td>
<td>1</td>
<td>0.2</td>
<td>.646</td>
<td></td>
</tr>
<tr>
<td>Status¹</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Text Messaging</td>
<td>1</td>
<td>11.4</td>
<td>.001</td>
<td>.108</td>
</tr>
<tr>
<td>Status * Text Messaging</td>
<td>1</td>
<td>&gt;0.1</td>
<td>.980</td>
<td></td>
</tr>
</tbody>
</table>

6.5 Student Perception of Use and Impact of Text Messaging Service

This section presents the results of the questionnaire on the use and impact of the text messaging service. The results are analysed in terms of student perception of the operation of the service and its effect on their learning experience. The results of the questionnaire provide a lot of data that is relevant to the research question as well as data on the perceived effect of the text messaging on other aspects of the students’ learning experience. The questionnaire used can be found in Appendix D. The questionnaire consists of two parts. Section A is made up of 30 specific questions on the use and impact of the text messaging service while Section B uses

¹ Due to lack of variance, degrees of freedom using Satterthwaite’s method cannot be computed
a series of open questions to give participants the opportunity of anonymously expressing their opinions in terms of using text messaging and its impact, if any, on them or their learning experience.

The questionnaire was completed by all participants in the treatment groups at the end of the treatment period. Thus the questionnaire was completed by all participants in Group C at the end of the first 13-week semester of the study and by all participants in groups E, G and H at the end of the second 13-week semester of the study. This meant that in total 44 participants completed the questionnaire. It should be noted that the participants refer to their instructor as their lecturer.

### 6.5.1 Quantitative Data

The first section of the questionnaire consists of 30 specific questions on the use and impact of the text messaging service. Participants were asked to indicate their response to each question on a 7-point Likert scale. The 30 questions are presented in Table 6.4 below along with the mean score and the standard deviation for each question. In addition, for each question the percentage of responses that were scored with 5 points or more is also shown.
### Table 6.8 Responses by participants in treatment groups to Section A of questionnaire using 7-point Likert scale (1=definitely not, 7=very much so), n=44

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean</th>
<th>%≥5</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you think that being in touch by text messaging with your lecturer is a good idea?</td>
<td>6.11</td>
<td>91%</td>
<td>1.10</td>
</tr>
<tr>
<td>2</td>
<td>Do you like receiving text messages from your lecturer?</td>
<td>5.55</td>
<td>86%</td>
<td>1.30</td>
</tr>
<tr>
<td>3</td>
<td>Would you like to receive more text messages from your lecturer?</td>
<td>4.43</td>
<td>55%</td>
<td>1.74</td>
</tr>
<tr>
<td>4</td>
<td>Were you surprised when the lecturer offered you a text messaging service?</td>
<td>5.57</td>
<td>77%</td>
<td>1.66</td>
</tr>
<tr>
<td>5</td>
<td>Do you enjoy the text messaging service?</td>
<td>5.52</td>
<td>77%</td>
<td>1.48</td>
</tr>
<tr>
<td>6</td>
<td>Do you like receiving text messages about the module?</td>
<td>6.02</td>
<td>84%</td>
<td>1.28</td>
</tr>
<tr>
<td>7</td>
<td>Do you like receiving non-academic text messages from your lecturer?</td>
<td>4.43</td>
<td>55%</td>
<td>1.77</td>
</tr>
<tr>
<td>8</td>
<td>Do you think the contents of the text messages you receive from your lecturer are appropriate?</td>
<td>5.70</td>
<td>77%</td>
<td>1.53</td>
</tr>
<tr>
<td>9</td>
<td>Do you think the text messaging service has improved your attitude to your lecturer?</td>
<td>5.57</td>
<td>80%</td>
<td>1.45</td>
</tr>
<tr>
<td>10</td>
<td>Do you think the lecturer is more approachable as a result of the text messaging service?</td>
<td>5.64</td>
<td>80%</td>
<td>1.60</td>
</tr>
<tr>
<td>11</td>
<td>Do you think you are more likely to ask questions in class as a result of the text messaging service?</td>
<td>4.59</td>
<td>61%</td>
<td>1.87</td>
</tr>
<tr>
<td>12</td>
<td>Do you think you are more likely to informally chat with the lecturer as a result of the text messaging service?</td>
<td>5.20</td>
<td>70%</td>
<td>1.65</td>
</tr>
<tr>
<td>13</td>
<td>Do you think the text messaging service has improved your attitude to the subject?</td>
<td>4.84</td>
<td>64%</td>
<td>1.67</td>
</tr>
<tr>
<td>14</td>
<td>Do you think the text messaging service has improved your attitude to the college?</td>
<td>4.57</td>
<td>57%</td>
<td>1.87</td>
</tr>
<tr>
<td>15</td>
<td>Do you think the text messaging service has been beneficial to your relationship with the lecturer?</td>
<td>5.25</td>
<td>75%</td>
<td>1.51</td>
</tr>
<tr>
<td>16</td>
<td>Do you think the text messaging service has improved the lecturer’s attitude towards you?</td>
<td>4.57</td>
<td>57%</td>
<td>1.42</td>
</tr>
<tr>
<td>17</td>
<td>Do you think the text messaging service has improved the lecturer’s attitude towards the class?</td>
<td>5.25</td>
<td>70%</td>
<td>1.43</td>
</tr>
<tr>
<td>18</td>
<td>Do you think the text messaging service has been beneficial to you?</td>
<td>5.75</td>
<td>89%</td>
<td>1.44</td>
</tr>
<tr>
<td>19</td>
<td>Do you think the text messaging service has been beneficial to your class?</td>
<td>5.55</td>
<td>80%</td>
<td>1.28</td>
</tr>
<tr>
<td>20</td>
<td>Do you like the subject more as a result of the text messaging service?</td>
<td>4.27</td>
<td>52%</td>
<td>1.53</td>
</tr>
<tr>
<td>21</td>
<td>Do you think the text messaging service has increased your motivation?</td>
<td>4.31</td>
<td>52%</td>
<td>1.51</td>
</tr>
<tr>
<td>22</td>
<td>Do you think the text messaging service has increased your</td>
<td>4.34</td>
<td>50%</td>
<td>1.64</td>
</tr>
</tbody>
</table>
6. Results and Discussion

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Percentage Agreeing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think the text messaging service has increased your participation in class?</td>
<td>4.55</td>
<td>52%</td>
<td>1.62</td>
</tr>
<tr>
<td>Do you think the fact that the text messages can be sent and received at any time and in any place is an advantage?</td>
<td>5.77</td>
<td>84%</td>
<td>1.61</td>
</tr>
<tr>
<td>Do you think that text messaging is an effective approach to support learning?</td>
<td>5.93</td>
<td>86%</td>
<td>1.19</td>
</tr>
<tr>
<td>Do you think you respond better to the text messages than you would to emails?</td>
<td>5.36</td>
<td>73%</td>
<td>1.90</td>
</tr>
<tr>
<td>Do you think text messaging is useful for the organisational side of learning such as announcements about room changes etc.?</td>
<td>6.48</td>
<td>93%</td>
<td>0.90</td>
</tr>
<tr>
<td>Do you think the text messaging service has helped you in your learning?</td>
<td>5.00</td>
<td>73%</td>
<td>1.48</td>
</tr>
<tr>
<td>Are you concerned about the potential cost of replying to the text messages?</td>
<td>3.34</td>
<td>34%</td>
<td>2.27</td>
</tr>
<tr>
<td>Do you feel that receiving text messages from your lecturer is intrusive?</td>
<td>2.80</td>
<td>16%</td>
<td>1.80</td>
</tr>
</tbody>
</table>

The responses of the participants to the questions are very revealing and give an insight into their perception of the use of text messaging for out-of-class communication with their instructor and its effect on their learning experience and environment. As the responses to each question were rated on a 7-point Likert scale it can be assumed that a score of 5 points would indicate that a participant’s response was generally positive, a score of 6 points would indicate that a participant’s response was very positive while a score of 7 points would indicate that a participant’s response was extremely positive. The percentage of participants who scored their response to a question with 5 points or more is a good measure of how positive the responses of the participants generally were to the questions, or how much they agreed.

Analysis of the results show that participants generally felt very positive about the introduction and use of the text messaging service with 91% of participants
agreeing that they thought that being in touch by text messaging with your instructor was a good idea and 86% of participants agreed that they liked receiving text messages from your instructor. While only a small majority of participants agreed that they wished to receive more messages from their instructor 77% of all participants agreed that they enjoyed using the service. When asked if they liked receiving text messages about the module 84% agreed that they did while only a small majority agreed that they liked receiving non-academic messages from the instructor. Interestingly the participants responded more positively to question two than question six. Over three-quarters of participants agreed that the content of the messages was appropriate with 93% of all participants responded to question eight with a score of 4 or more.

In terms of the effect of the text messaging on their relationship with their instructor three-quarters of participants agreed that the text messaging service had been beneficial to their relationship with the instructor and over 80% of participants agreed that it had both improved their attitude to their instructor and made their instructor more approachable. In addition 61% agreed that they were more likely to ask questions in class as a result of the service while 70% agreed that they thought they were more likely to chat informally with the instructor as a result of the service. Over 70% of those who responded felt the service had improved the instructor’s attitude towards the class while 89% agreed that they thought the service was beneficial to them and 80% agreed that it was beneficial to their class. Just over half of participants agreed that the service had improved their attitude to the college, had increased their liking for the subject and had increased their motivation, engagement and participation.
When asked if they were concerned about the potential cost of replying to the text messages 34% agreed that they were. However only a small number of messages sent had needed a reply and more and more students are now availing of free text messaging. There is also a difference between actual cost and perceived potential cost. While 84% of participants did not agree that receiving text messages from your instructor was intrusive seven participants had responded to question 30 with a score of 5 or more. This was taken seriously but subsequent investigation revealed that each of these seven participants had also scored their responses to both question two and question five with 5 points or more. Question two had asked if they liked receiving text messages from their instructor and question five had asked if they enjoyed the service. However, this further emphasised the need for careful and judicious use of the service and the need to speak to participants about any concerns they might have and also the need to make sure they fully realised that they could withdraw from the service at any time of their choosing.

When asked what they thought about the use of text messaging to support learning 86% of participants agreed it was an effective approach while 84% agreed that the ubiquitous nature of text messaging was an advantage. Nearly three-quarters agreed that they would respond better to text messages than to emails. The highest number of responses scored with 5 points or more was to question 27 which asked if participants thought that text messaging was useful for the organisational side of learning. The mean score of the responses to this question was 6.48 with 93% of participants agreeing that it was useful by scoring it with 5 points or more. When
asked if they thought the text messaging service had helped them in their learning. 73% agreed.

It terms of the research question the participants generally liked receiving the messages and they perceived that it improved their relationship with their instructor and his attitude towards them. It also made the instructor more approachable and made it more likely for them to talk to the instructor informally. This is further evidence that the text messaging had enhanced student perception of instructor immediacy.

6.5.2 Qualitative Feedback

The second section of the questionnaire gathered qualitative data from participants on their perceptions of communicating with their instructor using text messaging and its impact, if any, on them or their class in terms of learning and education and also in terms of the relationship with their instructor. A series of open questions were used to give participants the opportunity of anonymously expressing their opinions. In total six open questions were asked of the participants. The responses from the participants in the four treatment groups to the open question in section B of the questionnaire provided a great deal of valuable and insightful feedback into their perceptions of the effect of the text messaging service on their learning experience. Some typical responses of participants in each of the four treatment groups that completed the questionnaire to each of the six questions are shown in Appendix F.
The overwhelming majority of the feedback was very positive. Much of the feedback from the participants is very relevant to the research question. The feedback provides information about the perceived effect of the text messaging on the relationship between students and the instructor and provides further evidence that the text messaging improved student perception of their instructor’s immediacy. The participants generally perceived that the text messaging had improved their communication with their instructor and had made them seem closer. They also perceived that the approachability of the instructor had improved as a result of the text messaging as had their willingness to communicate with them.

The participants generally perceived that it was good to be in contact with their instructor by text messaging because they could contact the instructor at any time with a question, or to say that they would be late for a class or they could not make it. The text messaging also helped to keep them informed about the course and made it easy for them to get administrative information, such as room changes and dates for tests. They also perceived that it improved communication with the instructor by keeping them “in the loop” and up to date. They also felt that it made for a more natural and friendly relationship with the instructor and demonstrated that the instructor cared for them. The participants were all undergraduate computing students and one participant perceived that it was good because it was “using today's technology to keep in touch. A great way to keep students informed and up to date”.
6. Results and Discussion

When the participants were asked in what ways they thought the text messaging had been beneficial or detrimental to them and their education they responded that it kept them informed of what was going on and gave them time to prepare for class. They also reported that it had made them feel closer to the instructor and they felt more comfortable asking questions in class, or outside of class, about the course. One female participant, who was a mature student, responded that “it is nice to have such a nice rapport with Paul, it will be a shame to not have him in our class”. Another participant responded that it “has motivated me more to come to class, has improved my attitude towards college and subjects”. When asked in what ways (if any) they thought the text messaging service has been beneficial or detrimental to your class in general they again mostly responded very positively. They felt it improved communications and had improved the class’ relationship with the instructor and as a result they felt they had a more comfortable atmosphere in class and they perceived that their learning was better. They also felt it had brought the instructor closer to the class, had become a talking point among them, and had brought the class closer together as a result. They also perceived that there were many benefits from it and that the class had a higher attendance as a result.

The fourth question asked was particularly relevant to the research question. It asked the participants in what ways, if any, did they think the text messaging service has improved or disimproved their relationship with the instructor. The participants mentioned many ways in which it was perceived that it had improved the relationship and not one mentioned that it had disimproved the relationship in any way. Having the instructor’s mobile number was mentioned by one participant as a reason they felt closer to the instructor and generally the level of
communication with the instructor was perceived as being high. Another participant perceived that the text messaging had improved the relationship because they did not only relate to the instructor standing in front of the class and dictating notes but they also saw them as someone they could communicate with. Yet another participant responded that it made them warm to the instructor because they felt that the instructor was only trying to help them advance in their education. The service was also perceived as good for students who were not great at one-to-one meetings or in front of class. Generally the participants felt that the text messaging had made the instructor more approachable and it was now easier to talk with the instructor about the subject or talk with them outside class. It also gave them a feeling that the instructor cared about them.

When asked in what ways, if any, they thought the text messaging service has helped or hindered them in their learning some of the participants responded that it reminded them to study before class and was better than email for notifying them at short notice of any changes to the schedule. While some also reported that it had motivated them to attend classes, others reported that it had little effect on their learning. One participant responded that when they were sick they were able to let the instructor know by text message and the instructor was then able to tell them what they were missing.

The responses to the last question are particularly revealing in terms of the overall assessment by participants of the use of text messaging for out-of-class communication and their perceptions of the study. The question asked participants if they wanted to make any comments on the text messaging service or on the
6. Results and Discussion

research study. They generally responded that it was a good service to students and improved communications. They also felt that others should use text messaging as a means of communication and that it was easier to communicate by text than by email. One participant felt that it should be applied to all modules. They also felt the research study was innovative and should be developed further as it was a different approach in dealing with instructor-student communication.

While the feedback was very positive it was also clear that a number of the participants had a few concerns about the text messaging. Their concerns were around the potential cost of replying to the text messages, the timing of the messages and the relevancy of the messages to their course. In terms of costs many of the participants were using the same mobile provider as the instructor and had no cost associated with sending messages to the instructor. However it may have been a concern for some of the other participants. The number of messages sent that required a reply from the participants was quite small however, usually about one per week. Replying by text message was purely optional and was not included as part of course assessment. In addition if participants wished they could use email instead of text messaging. However, in the interest of fairness to all it was decided to give consideration to this concern for the future operation of the service. Perhaps a way could be found such that all students could avail of free text messaging. In the meantime it was decided to keep the number of text messages that required a reply small. A few participants also seemed to have concerns about the timing and relevancy of the text messages. When they consented to participate in the service they were given the set of guidelines for the operation of the service. Every effort was made to adhere to these guidelines. Interestingly, one participant reported that
they usually received the messages when they are in the cinema. The guidelines stipulate that the service should only run up to 8pm on a weekday so they may have gone to an early showing. As regards the relevancy of the messages, every message that was sent was related to student learning. However not all were directly related to the course content. Some were designed to enhance affective learning and encourage attendance and engagement. Perhaps it was this type of message that the respondents were referring to. However it had been made clear to all participants on a number of occasions that while all the messages were related to their learning they did not always directly relate to the course content. However, this was treated as valuable feedback from the participants and would be considered in terms of the future operation of the service.

6.6 Discussion

The main research study facilitated the gathering of empirical data that allowed the research question to be addressed. Quantitative measures of perceived instructor immediacy as well as the feedback from participants support the hypothesis that the use of text messaging for out-of-class communication between instructor and student enhances student perception of instructor immediacy. In addition the feedback reveals that the participants perceived that the text messaging had other positive effects on their learning experience.

A statistical analysis of the data gathered from the two immediacy instruments, namely the GI scale and the PNIB scale, demonstrates that participants in the groups that used the text messaging service had significantly higher levels of
perceived instructor immediacy than those in the control groups who did not use the service. In addition the statistical analysis shows that the observable difference in instructor immediacy levels between the treatment and control groups could not be explained by other factors such as student status or previous exposure to the instructor.

The quantitative and qualitative feedback from the participants, gathered by use of the questionnaire, shows that the participants perceived that the text messaging had improved their relationship with the instructor making the instructor seem closer and more approachable. It also made it more likely for them to ask questions in class and engage in discussions with the instructor. In addition, it made them feel more comfortable and at ease in the classroom and gave them a feeling that the instructor cared for them. This is more evidence of the ways in which the text messaging service had enhanced student perception of instructor immediacy. While analysis of the quantitative data from the two immediacy instruments shows that the text messaging did have an effect on perceived instructor immediacy the feedback from the questionnaire provides a much richer picture of the ways in which this had happened. Not only did the feedback for the questionnaire show how the text messaging had positively affected perceived instructor immediacy but it also provided valuable information on the impact of the text messaging on other areas of the participants’ learning experience. The text messaging had kept participants informed about the course. It was particularly useful for administrative purposes such as room changes and changes to the schedule. Participants mentioned that it made them more likely to attend class and made them feel more comfortable in class. In addition some reported that it encouraged and motivated
them in their learning. While some participants expressed a few reservations about the text messaging these were taken into account and whatever lessons were learnt from the study would be used to ensure that these concerns were addressed in any future use of the service.

6.7 Summary

In this chapter the results for the main research study were presented and discussed. The chapter began by outlining the levels of participation by students in the study and an analysis was presented of the numbers of text messages that were sent and received. A statistical analysis of the quantitative data from both the high-inference and low-inference instruments used to measure perceived instructor immediacy concluded that the participants in the groups that used the text messaging service had a significantly higher level of perceived instructor immediacy than those in the control groups. In addition it was shown that the status of the students or their previous exposure to the instructor could not explain the observed differences between the groups. The questionnaire that was completed by participants at the end of the treatment period provided both quantitative and qualitative data on their perception of the use of the text messaging service and its impact on their learning experience. Analysis of the quantitative data showed that participants generally liked receiving the messages and they perceived that it improved their relationship with their instructor and his attitude towards them. It had also made the instructor more approachable and had made it more likely for them to talk to the instructor informally. The qualitative feedback from the open questions also showed that participants generally perceived the text messaging as being very beneficial and as
improving their relationship with the instructor. While a few participants did express some concerns in terms of cost as well as timing and relevancy of the messages, it was generally felt that the text messaging had made the instructor more approachable and as a result it was easier to talk with them. The participants also reported that the text messaging had reduced any perceived barrier to approaching and communicating with the instructor, giving the participants a feeling that the instructor cared about them.
7 Conclusions and Future Perspectives

7.1 Overview

The results of the main study demonstrate the positive effects of the use of text messaging for out-of-class communication between instructor and student on student perception of instructor immediacy. The results also provide some evidence of other positive effects of the text messaging on student learning experience, including reports by students that the text messaging encouraged and motivated them in their learning and made them more likely to attend class. Enhanced immediacy is very important in terms of the quality of student learning and has many implications in terms of education, including improved attendance, motivation and engagement by students. The research is interdisciplinary in nature, intersecting the fields of both instructional communication and mobile learning. The findings of this research are a contribution to both fields as they demonstrate how the use of mobile technology in education can lead to enhanced instructor immediacy.

The main study was successful in providing empirical evidence for the research question. The findings are conclusive in terms of the positive effect of text messaging on perceived instructor immediacy. The study has some limitations which are discussed but there are none that cannot be overcome by future research work. While the feedback from participants shows that they are generally very
positive about the use of text messaging for instructor-student communication some had concerns about it. These concerns highlight the importance of guidelines on the sending and receiving of messages by instructors. A recent research study has shown that some members of teaching staff may also have reservations about such communication (Horstmanshof 2004).

The results of the study clearly demonstrate the positive effect of the text messaging on perceived instructor immediacy. The research literature shows that enhanced instructor immediacy has many benefits in terms of student learning experience. However, the study itself did not consider the effect of text messaging on affective and cognitive learning, although some of the feedback from participants indicates that it did have some influence on affective learning. The review of the research literature suggests that there is a strong link between perceived instructor immediacy and student learning. Further studies would be required to demonstrate the effect of the text messaging on student learning.

The main conclusion of this thesis is that the use of text messaging for out-of-class communication can significantly enhance student perception of instructor immediacy. This finding is very important for all those involved in teaching students. While it is recommended that more instructors use text messaging for out-of-class communication there are also few barriers to mainstreaming this approach that need to be considered. While this thesis focused on the use of text messaging for out-of-class communication, there are also a lot of other technologies that could be used to provide an extra communication channel between instructor and student. However, as is the case with text messaging, the use of these technologies has to be
7. Conclusions and Future Perspectives

considered very carefully, as each has both advantages and disadvantages. The use of some of these technologies as a means of enhancing communication in education can also be looked at in future research work.

7.2 Summary of Findings on Immediacy

The primary purpose of the main study was to investigate the effect of the use of text messaging for out-of-class communication between instructor and student on student perception of instructor immediacy. Instructor immediacy was measured for each participant using two different instruments, namely the Generalised Immediacy (GI) scale and the Perceived Nonverbal Immediacy Behaviors (PNIB) scale. Both sets of measurements demonstrate that participants in the groups that used the text messaging service had significantly higher levels of perceived instructor immediacy than those in the control groups who did not use the service. Measurement of instructor immediacy using the GI scale showed that participants in the treatment groups perceived their instructor as being on average 9% to 16% more immediate than participants in the control groups. For the PNIB scale the difference in measurements was on average 8% to 9%. In addition, a statistical analysis of the measurements across the groups showed that the observable difference in instructor immediacy levels between the treatment and control groups could not be explained by other factors such as student status or previous exposure to the instructor. It can be concluded that the effect on student perception of instructor immediacy was due to the use of text messaging for out-of-class communication.
7. Conclusions and Future Perspectives

The quantitative and qualitative feedback from the questionnaire showed that the participants generally liked receiving the text messages and they perceived that it improved their relationship with their instructor and his attitude towards them. The participants also perceived that it made the instructor more approachable and made it more likely for them to ask questions in class and engage in discussions with the instructor. In addition, it made them feel more comfortable and at ease in the classroom and gave them a feeling that the instructor cared for them. This is further evidence of the effect the use of out-of-class text messaging had on enhancing student perception of instructor immediacy.

7.3 Impact on Student Learning Experience

The review of the research literature in the field of instructional communication, presented in Chapter 2, highlights the importance of instructor immediacy. Research studies suggest that improved instructor immediacy leads to more positive student-instructor relationships engendering positive attitudes, increased interest and motivation by students as well as improved attendance, improved retention, improved student engagement and improved learning (Allen et al. 2006; Kearney et al. 1985; Rocca 2004; Witt et al. 2004). These are all highly desirable traits and behaviours and demonstrate the potential benefits of enhanced immediacy.

Research studies on instructor immediacy also show a significant relationship between instructor immediacy behaviours and students' affective learning (Andersen 1978, 1979; Andersen et al. 1981). In addition, they provided a strong
7. Conclusions and Future Perspectives

case for a meaningful and positive relationship between perceived instructor immediacy and student cognitive learning (McCroskey and Richmond 1992).

In the feedback some participants mentioned that the text messaging made them more likely to attend class and made them feel more comfortable in class. In addition, some reported that it also encouraged and motivated them in their learning. This is evidence of the text messaging having a positive effect on student affective learning as well as student learning experience. It may well be that instructor immediacy is a mediating factor between the use of text messaging for improved instructor-student communication and enhanced affective learning by students. It is recognised, however, that a lot more work is required to show a definite link between the text messaging and student affective and cognitive learning. While this research work focussed primarily on the construct of instructor immediacy, future research may focus on other effects of enhanced instructor-student communication.

7.4 Limitations of Study

While the main study provided empirical evidence in the form of both quantitative and qualitative data on the effect of the use of text messaging on perceived instructor immediacy and student learning experience, it did have a number of limitations. The main limitation is that the sampling method used was convenience sampling. This is quite common in educational research but does create some challenges (Fraenkel and Wallen 2006). Lack of random sampling introduces issues that need to be addressed by the researcher in terms of limitations of the
study and differences between the groups in the studies. In addition the representativeness of the sample and the generalisability of the findings need to be argued on a logical basis (Wiersma and Jurs 2005).

The differences between the groups in the main study were minimised and a number of different groups were used to allow for control of such factors as student status and previous exposure to the instructor. From this perspective it can be concluded that the groups were very similar and the study was successful in demonstrating a significant difference in immediacy between treatment and control groups. However there are limitations to the generalisability of the findings due to the non-representativeness of the samples used. However the purpose of this research was to demonstrate a significant effect of text messaging on student perception of instructor immediacy and not to generalise the findings for all students in third-level education. The convenience sampling used in the main study means that the sample is not representative of the overall population of third-level students. The sample is limited to only one discipline and the subjects are predominantly male. In such a case caution needs to be taken when generalising the findings. The literature on education research recommends repeating the study with a number of different samples to increase confidence in the findings (Fraenkel and Wallen 2006). More studies are required in the future in different educational institution worldwide using larger and more representative samples before the findings can be generalised. This does not however diminish the importance of the findings of this research.
As regards the samples used in the main study there is little in the research literature to suggest that gender is a major factor in terms of perceived instructor immediacy. In terms of discipline the research literature does suggests that the magnitude of perceived immediacy and its effect on student affective learning vary according to the type of course-content (Kearney at al. 1985). Students who studied people-oriented disciplines, such as human resource management, were found to be particularly sensitive to immediacy-related instructor communication behaviours, more so than those who studied task-oriented disciplines such as computing. This would seem to suggest that the effect of the text messaging on perceived immediacy might be larger for the former. However, as the participants in the treatment groups of the main study were computing students and therefore more technology-oriented, they might be more likely to accept the use of text messaging more readily. As the effect on student perception of instructor immediacy that was observed during the main study was quite strong it is doubtful if the gender or discipline of student would make any significant difference to the overall findings.

Another factor that could be viewed as a limitation of the study was the fact that the experimental procedure was single-blind. For the study the instructor was the main researcher and so was aware of the goal of the experiment. It was not practical to use a double-blind procedure as it would have required that another instructor provide the text messaging service and the main researcher act simply as an observer. The single-blind experimental procedure that was used proved effective. The participants were not aware of the goal of the study or the research question. The instructor took every precaution to ensure the participants, who were all students of the instructor, were not made aware of the goal of the research. In
addition, great care was taken by the instructor so as not to introduce on their part any unintentional bias into the experiment. As far as the instructor was concerned the purpose of the out-of-class text messaging service was to simply support students and their studies.

7.5 Concerns with Instructor-Student Text Messaging

Some of the participants in the main study who used the text messaging service had some concerns as was evidenced in their feedback. Their concerns were around the potential cost of replying to the text messages, the timing of the messages and the relevancy of the messages to their course. In terms of cost many of the participants used the same mobile provider as the instructor and so had no cost associated with sending messages to the instructor. However the cost may have been a concern for some of the other participants. In the interests of fairness it was decided to give this concern serious consideration in terms of any future operation of the service. It was felt that if it could be demonstrated that the text messaging was beneficial to the learning experience of students then perhaps a way could be found to persuade the management of educational institutions to subsidise or make free text messaging available to students to support their learning. Until the cost of replying to the text messages is no longer a concern for students it was decided that the number of text messages that require a reply would be kept very small. The cost was only a concern for those who wanted to send messages to the instructor. It must be pointed out that there is no charge for receiving a text message in Europe. However, this is not always the case in countries outside Europe.
A few participants also seemed to have concerns about the timing and relevancy of the text messages. This highlights the importance of judicious use as well as the need for guidelines on the sending and receiving of text messages. All those involved with the text messaging need to be aware of the guidelines and it is important that they be adhered to as much as possible. A few of the participants also felt that some of the text messages were not relevant. This may be explained by the fact that some of the messages were not directly course-related but were aimed at enhancing affective learning among students and encouraging interest, attendance and engagement. While these messages were generally welcomed by participants it was decided that the guidelines should be updated to explain the different types of messages participants could expect so as to avoid any misunderstanding. The participants would then be fully informed of what they could expect before giving their consent to participate in the service. The guidelines for instructor-student out-of-class text messaging are a very important output of the research work and are under constant review.

Another potential concern may surround the often colloquial nature and ad-hoc use of text messaging that might potentially lead to misuse of the service, a phenomenon that was observed in the early days of the introduction of email in organisations. Students should be made aware that text messages in this context are still part of the learning experience and that they need to bear in mind that it is their instructor they are communicating with and not one of their friends. There is a fine but significant line between high-levels of perceived instructor immediacy and close personal friendship. Students might misinterpret the higher availability and closer interaction with the instructor as a kind of peer relationship. This may lead
them to be surprised or disappointed when the instructor executes the necessary duties of their role such as disciplining students or allocating marks. The experience of the instructor is that the text messaging makes it more likely from students to communicate informally with them. While this is a positive effect it also highlights the importance for the instructor of always bearing in mind their role as an educator and not as a personal friend.

In their feedback participants indicated that they would like text messaging to be used by more instructors and some felt it should be used with every module. However it stands to reason that the number of different modules taken by students would need to be taken into consideration as to how many text messages they can receive from each instructor and how often. While the experience of the instructor who provided the text messaging service was very positive not all members of academic staff might agree that it is worthwhile. The experience of the instructor was similar to that of Horstmanshof (2004). Some older more traditional colleagues had reservations to this approach. They argued that it would add to their work burden and they also felt the approach was ‘mothering’ the students and would lead to dependency. However, the amount of extra work required was minimal. Text messaging is asynchronous and therefore the instructor does not need to reply immediately. In addition, text messages are usually short and to the point due to their limited length. The use of a software application such as the one used for the main study also makes the text messaging very easy. However, for very large classes there could possible be quite a bit of extra work involved. This could be explored in future work. In terms of the criticism of the text messaging as ‘mothering’ the students it can be argued that if students feel an affinity with their instructor and their course they are more likely to explore new areas of learning.
independently, especially if encouraged to do so by their instructor. There is also a strong connection between enhanced affective learning and lifelong learning (McCombs 1991).

7.6 Guidelines for Instructor-Student Text Messaging

As mentioned previously the guidelines for instructor-student out-of-class text messaging that were developed at the end of the third preliminary study are a very important output of the research work. The guidelines are necessary to avoid incorrect expectations of the text messaging service by students. They inform the student of the level of service they can expect and this may help to avoid misunderstandings. The student is required to read and familiarise themselves with the guidelines prior to consenting to participate in the service. The guidelines were drawn up on consideration of the feedback from the student focus groups and on reflection by the instructor as to the appropriateness and effectiveness of text messaging for communicating with students. These guidelines were used throughout the main study and they worked very well in so far as there were no complaints from participants and no participant withdrew from the service. While the guidelines are quite comprehensive in scope they are under constant review and will be updated at any stage if it is considered necessary.

Probably the most important lesson learnt from the main study was that students need to be informed fully so that they are in absolutely no doubt what to expect from the service before they give their consent to participate. From the anonymous
feedback it is clear that a small number of students did not consider the content of some of the messages appropriate. The conclusion here is that they must not have been fully aware of the type of service they were consenting to participate in and so may have had incorrect expectations of it. These students may well have expected the messages to be directly related to the course content and so were surprised when they received a few messages designed to encourage them in their studies.

The guidelines cover the need for informed consent for participants as well as the right of participants to withdraw from the service at any stage. They also specify the quality of service that participants can expect, including maximum limits on the number of messages as well as maximum response times and hours of operation. In addition the guidelines also include some stipulations about when text messages should not be sent to students, for example the day before an examination. This is intended so as to avoid what might be perceived as unfair advantage by some of their peers.

While this research concludes that guidelines are very important for the use of text messaging for instructor-student communication there is little doubt that the guidelines could vary somewhat from one institution to another. It is hoped that the guidelines developed as part of this research work may be of interest not only to researchers but also to practitioners who may be interested using text messaging for instructor-student out-of-class communication. It is hoped that the guidelines can provide interested practitioners with some guidance and helping in developing their own set of guidelines based on their particular situations and requirements and also taking into account the opinions of their own students.
7. Conclusions and Future Perspectives

7.7 Future Perspectives

7.7.1 Further Studies

Further research studies will be needed to explore the scalability and generalisability of the results across multiple educational institutions, subject domains and cultures. Text messaging might also be used in school settings with similar effect. More work is also required to investigate the impact of text messaging on other learning factors. For example, it is anticipated that both student motivation and learning affect would also benefit from the use of out-of-class text messaging but this needs to be demonstrated empirically.

7.7.2 Other Channels of Immediacy

This research work has shown how the use of mobile communication technology, in the form of out-of-class text messaging, can enhance student perception of instructor immediacy. Text messaging has the properties of being asynchronous and ubiquitous which make it suitable for supporting out-of-class communications. There are also a number of other technologies apart from out-of-class text messaging that could also provide channels of communication between instructor and student which could lead to enhanced instructor immediacy. However, as with out-of-class text messaging, the use of these technologies would require very careful consideration. The use of in-class text messaging might also enhance immediacy but many institutions do not permit the use of mobile devices in class as they are seen as disruptive.
As well as speech and text messaging mobile technologies also offer the options of multimedia messaging, instant messaging, wireless networking and Bluetooth connections. Many mobile devices also have access to the Internet which offers a plethora of possible communication channels for instructor-student communication. The technologies include simple asynchronous email, instant messaging (IM) services and also voice-over-IP (VOIP) services. Some universities even have a presence on virtual reality sites such as Second Life. Immediacy and other variables such as social distance and teaching distance (Garrison et al. 1999) are being viewed with more and more importance in the field of e-learning and distance education. With the rapid adoption of the Internet as a mainstream communication medium there has been recognition of the importance of the dynamics of interpersonal communication in the online environment. There are many commonalities between traditional immediacy producing behaviours and online interpersonal communication (Woods Jr & Baker 2004). The convergence of technologies and the omnipresence of mobile communication devices in the near future will see the goal of transparent immediacy, as discussed in Chapter 3, become closer to reality.

7.7.3 Future of Instructor-Student Test Messaging

There are many challenges to mainstreaming the use of text messaging for instructor-student out-of-class communication in higher education. For this study the instructor used a laptop with a special software package that worked much like an email program, recording each message sent and received. While this worked
well for the purpose of this study, the use of such text messaging on a larger scale would have some extra requirements which would need to be met. Firstly, integration with existing student record systems would be required in order that instructors would not have to collect student phone numbers individually. In many cases, these numbers are already included in the student records. Secondly, text messaging would need to be integrated with existing Learning Management Systems (LMSs) to reach its full potential. The LMS would allow instructors to send messages to complete classes by a single click. It would also serve as a permanent record of all communication. Such integration would also allow easy reference to subjects and learning resources, for example by the inclusion of a URL in a text message text pointing to the location of class notes on the LMS.

The use of email for communication between instructors and students has now become mainstream. There may be some parallels between the initial adoption of email and the proposed use of text messaging that can be explored. However, it may be some time before text messaging is generally accepted as a means of communications between instructors and students even though it is being used more and more by educational institutions for communicating administrative information to students. In fact a number of studies show that students prefer to receive text messages of this type than emails. However, as text messaging is much more personal in nature than emailing, the number and type of messages sent to students needs to be carefully monitored. While presently most educational institutions do not require student consent to send emails to them, this is not recommended for text messaging.
7. Conclusions and Future Perspectives

The main conclusion of this thesis is that the judicious use of text messaging for out-of-class communication can significantly enhance student perception of instructor immediacy and thus has many benefits in terms of student learning experience. This finding is very important for all those involved in teaching students. While it is recommended that more instructors adopt the use of text messaging for out-of-class communication with students there are some barriers to mainstreaming this approach in higher education that need to be considered. As with any new development many instructors and educational institutions may be slow to adopt this form of communication. Their concerns may be well-founded and this thesis has attempted to show how these may be addressed. It is felt that if proper precautions are exercised, the benefits of using text messaging for instructor-student out-of-class communication far outweigh any potential risks.
References


Jordan, F. F. and Wheeless, L. R. (1990) 'An investigation of the relationships among teachers' verbal immediacy, paralinguistic immediacy, and speech accommodation in diverse classrooms'.


40th Hawaii International International Conference on Systems Science (HICSS-40 2007), Hawaii, USA, 64-64.


Appendices

Appendix A. Survey of Mobile Device Usage and Perception of Mobile Learning amongst Third-Level Students

Researchers: Niall Relihan and Paul Hayes

Section 1: Device Ownership

1. How many mobile communication devices do you own?
   - □ None    □ One    □ More than one

2. Which mobile network provider do you predominantly use?
   - □ None    □ O2    □ Vodafone    □ Meteor    □ 3

3. What type of mobile communication device if any do you use predominantly?
   - □ None    □ Mobile Phone    □ Smartphone    □ PDA

4. What is the brand and model of this Device? (E.g. Nokia 33i etc.)
   _______________________

5. How much money did you spend when purchasing on your mobile device?
   - □ < 50 euro    □ 50-100 euro    □ 100-200 euro    □ >200 euro

6. Are you likely to buy a new phone before the end of the year?
   - □ Yes    □ No

Section 2: Technology-Enabled

7. Is your phone Bluetooth enabled?
   - □ Yes    □ No    □ Don’t Know

8. Is your phone GPRS enabled?
   - □ Yes    □ No    □ Don’t Know

9. Is your phone 3G enabled?
   - □ Yes    □ No    □ Don’t Know
Section 3: Usage-Patterns

10. In the last six months how many (approx) ringtones have you downloaded to your phone?

__________ 

11. Have you ever purchased a game for your phone?

☐ Yes    ☐ No

12. If so, in the last six months, how many (approx) games have you downloaded to your phone?

__________ 

13. Have you ever purchased a picture/logo for your phone?

☐ Yes    ☐ No

14. If so, in the last six months, how many (approx) pictures/logos have you downloaded to your phone?

__________ 

15. Have you ever sent a premium-charged SMS? eg. when buying a game

☐ Yes    ☐ No

16. Have you ever cast a vote via SMS? e.g. to Pop Idol, You're a Star etc

☐ Yes    ☐ No

17. How many text messages (approx) do you send in a week?

☐ <15    ☐ 15-30    ☐ 30-50    ☐ >50

18. What is the main purpose of your text messages?

☐ Social    ☐ Course-Related    ☐ Other

19. How many phone calls a week (approx) do you make using a mobile device?

☐ <5    ☐ 5-10    ☐ 10-15    ☐ 15-20    ☐ >20

20. If you own a mobile phone, how much money do you spend on it per week?

☐ <10 euro    ☐ 10-20 euro    ☐ 20-40 euro    ☐ 40-70 euro    ☐ >70 euros
Section 4: Perception of Mobile Learning

21. Have you heard of Mobile Learning before?
   □ Yes  □ No

22. Do you think it is a good idea to use mobile devices to help learning?
   □ Yes  □ No

23. Have you ever used a mobile device to meet a learning objective?
   □ Yes  □ No

24. How many text messages related to your course (approx) do you send on average in a week?
   □ None  □ <5  □ 5-10  □ 10-20  □ >20

25. Would you be interested in using a mobile device to learn content from your course?
   □ Yes  □ No

26. Would you prefer to (a) learn content exclusively from a mobile device or (b) use the mobile device content in conjunction with other course materials
   (a) □  (b) □

27. In terms of mobile learning how long do you think each lesson should be when using a mobile device?
   □ <5mins  □ 5-10mins  □ 10-20mins  □ > 20mins

28. Would you be prepared to upgrade your device to one that supports mobile learning?
   □ Yes  □ No

29. How much money would you be prepared to spend on learning via a mobile device per lesson?
   □ <5euro  □ 5-10euro  □ 10-20 euro  □ >20euro

30. How many times would you access learning material through your mobile device per month?
   □ <5  □ 5-10  □ 10-20  □ >20
31. While travelling on a journey on a train, bus or car etc, for an hour, how much of this time would you spend using a mobile device?

- □ <5mins
- □ 5-10mins
- □ 10-30mins
- □ 30-40mins
- □ >40mins

32. Do you think SMS reminders regarding assignments would be useful?

- □ Yes
- □ No

33. Do you think access to the lecture notes via your mobile device would be useful?

- □ Yes
- □ No

34. What do you think is a reasonable time to wait for downloading a mobile learning application?

- □ <10secs
- □ 10-30secs
- □ 30-60secs
- □ >1min

35. How important is the use of colour, graphics and animation in a mobile learning application?

- □ Very Important
- □ Important
- □ Not Important

36. Would you consider using a mobile device to collaboratively work with other students on a task?

- □ Yes
- □ No

37. Would you consider listening to audio files of lectures or course material through a mobile device?

- □ Yes
- □ No

Thanks very much for taking the time to complete this questionnaire.
Appendix B: Transcripts of Interviews with Student Focus Groups

Appendix B.1. Interview with Full-Time Second-Year Higher Certificate Students

From a voice recording made on 1\textsuperscript{st} October 2007 of an interview with a focus group of second-year full-time undergraduate students studying for a higher certificate in computing about any potential concerns that may have arisen with the text messaging service and possible guidelines that should be observed when using it.

\textbf{Interviewer:} How do you feel about a lecturer sending you messages?

\textbf{Student:} Fine. I think it’s helpful.

\textbf{Other Student:} I thought it was weird at first, because you never have a teacher texting you when you’re in school.

\textbf{Interviewer:} Have you changed your mind?

\textbf{Student:} I’ve gotten used to it, I just though it was weird at first giving a lecturer your mobile number. It is helpful though. If a class gets cancelled or some sort of change. It’s great for that, because it means you get an extra lie on.

\textbf{Interviewer:} Would you find it a bit annoying?

\textbf{Student:} Well people would be texting you anyway. It takes two seconds of your time to look at a text.

\textbf{Interviewer:} Would you find it intrusive or would you be worried about privacy?

\textbf{Student:} It wouldn’t really be invading our privacy. You would only be texting us about our classes. If you were texting us just saying ‘hi, what’s the story?’ I would say you can take my number off your database.
Other Student: Yes, but at the end of the day, a text is only a text. You can delete it straight away.

Interviewer: Were you surprised when your lecturer offered you his mobile number?

Student: Yes. We were all saying ‘what’s going on here, what’s this all about?’ It was a new method I never heard of before.

Interviewer: Did you feel any pressure about giving the lecturer your number?

Student: Yes, there was a certain amount of pressure.

Other Student: I didn’t really want to give you my number at the start. I just wondered why I was giving my mobile number to someone I had just met.

Interviewer: You didn’t have to, did you?

Student: Well you gave us the sheet and we had the option to say no, but we were all kind of looking at each other saying what are we going to do like? We could always just ask to have our number taken off. When I got the sheet, everyone had signed already, so I didn’t even read it, I just signed it.

Interviewer: Sure you’re always free to withdraw if you want anyway.

Student: Sure what’s the worst that can happen?

Interviewer: Do you like getting the texts?

Student: I like them when you say about late classes. I liked when you said about the other lecturer’s class was delayed. It’s good when you say we’re going to be late, or we’re going to reschedule this class for another time or what we are going to be doing in class, because sometimes you are walking in like a blind person.

Interviewer: So do you think the messages should be about academic things, or do you think it really matters?

Student: I think it should be academic.
Other Student: I don’t think it matters really.

Interviewer: What about saying have a good weekend?

Student: That’s grand like.

Interviewer: Are you concerned about the cost of replying to texts?

Student: Some people get free texts on their phone and otherwise a text only costs a few cents. It’s nothing major.

Interviewer: Do you think you get too many texts from the lecturer?

Student: No, sure you only text us on a Thursday or a Friday.

Interviewer: Would you be concerned about how you reply, say for instance you might think you said the wrong thing. Would that bother you?

Student: Not at all to be honest. If you send the wrong message to somebody, you just text them back and tell them it wasn’t for them.

Interviewer: Do you think there should be a limit on how many texts are sent per week?

Student: Well you only send us two a week as it is. You might text us saying have a good weekend, good class today. It’s not personal, it’s generalised, because it’s sent to everyone.

Interviewer: Up to what time in the evening do you think it would be acceptable to receive text messages?

Student: It doesn’t really matter. If your phones on, your going to get a text message. Your mate would text you after eleven o’clock.

Other Student: It would be strange to get a message off your lecturer at half eleven, twelve o’clock. If you’re in for an early morning class and it has been cancelled, I’d rather get it late at night than at nine o’clock the next morning. If you get it the night before, you can relax.
Other Student: It would be better to get it at nine o’clock the night before.

Interviewer: What about in the morning time?

Student: I think you’re better off texting the night before. Don’t text in the mornings. None of us will get it. We will end up coming in here and going home again.

Interviewer: What about receiving messages over the weekend?

Student: It’s the same as getting a message during the week. A message is a message. You can just delete it. As long as your not bombarded with eight or nine messages a week.

Interviewer: So is there anything else that you can think of that you want to mention about the text messaging?

Student: I think it’s a good idea to be honest with you. I think you should get the other lecturers into it. When we were in first year, a lot of classes in the mornings were cancelled. You’re after getting up early, you probably missed breakfast, and you may not have slept well the night before. You could do with the extra hour sleep.

Interviewer: Do you all think that’s true yes?

Student: It would also be good if we were studying for a test. You know when you’re studying for a test and you just can’t get something, a little help would be great.

Interviewer: I think it’s fair enough to ask questions alright.

Student: You know for instance if your Internet was not working and you couldn’t figure out the seventh layer.
Appendix B.2. Interview with Part-Time Third-Year Degree Students

From a voice recording made on 4th October 2007 of an interview with a focus group of third-year part-time undergraduate students studying for a degree in computing about any potential concerns that may have arisen with the text messaging service and possible guidelines that should be observed when using it.

**Interviewer:** I want to talk to you about the text messages you have been getting. Maybe we could agree some ground rules. It’s probably unusual that you’re communicating with your lecturer I guess. It’s probably the first time that it’s happened? Would you find it unusual?

**Student:** I probably would, unless it’s a problem, something out of the ordinary or you were going to be late for class or something like that.

**Interviewer:** So that’s the main reason? You wouldn’t feel like a friendly chat or a one to one? Probably unlikely? Initially anyway.

**Student:** Well it depends. It’s a bit strange at first getting a text off your lecturer saying ‘how did you get on at the weekend?’, whereas now were kind of expecting it. (Other student) Is this a standard thing?

**Interviewer:** No it’s not standard. It’s just me. It’s just an experiment that I’m personally doing. I’m just interested in seeing the effect.

**Student:** It is different though. I think you can get a bit more interaction. It makes you seem more approachable as a lecturer. When I was in college before, they would look at the deans or the lecturers and that was it, set in stone.

**Interviewer:** Are the messages annoying or obtrusive? What about privacy?
**Student:** I don’t think there’s a problem with privacy. I suppose just that it’s new and we don’t know what to do with it.

**Interviewer:** Do you think it’s strange with the lecturer giving you his number?

**Student:** No that’s fine. It makes the lecturer more approachable.

**Interviewer:** Do you think that’s a good thing?

**Student:** Yes that is good.

**Interviewer:** Did you feel under pressure to give your number to the lecturer?

**Student:** I suppose it depends on the lecturer and who they are. We’ve gone through the ropes and the contract and know who you are, but maybe if it was a first or second year, it might be different.

**Interviewer:** Do you think the contents of what you receive are appropriate of what you receive or do you think it should be just about the classroom?

**Student:** I think in your respect that sometimes you don’t know what to say, but I think at the same time you have to find a balance.

**Interviewer:** Do you think it could be used for sending all types of messages or do you think they should only be related to the course?

**Student:** I think it would be only related to the course unless there were other activities. It would also be good if you could send out a message to see if any student has a problem.

**Interviewer:** What about saying ‘have a nice weekend?’

**Student:** (Not audible)

**Interviewer:** Do you think there are too many or too few messages sent?

**Student:** I would say it’s just about right, it’s not everyday like. Maybe after a lecture say good lecture, or have a good weekend, see you next week. I think the number is fine.
Interviewer: Do you think there is a need to set a maximum number of text messages per week?

Student: I think four per week would be the max. I think it’s useful too. For example, as a reminder for a test. If a student is responding to you with personal things that need you help, obviously that will call for more messages.

Interviewer: What time of day and night do you think is appropriate?

Student: I reckon that on a working day maybe up to eight or nine o’clock. I also think it depends on the person. Certainly some time before ten.

Interviewer: What about the morning time?

Student: (Not audible)

Interviewer: What about the weekends? Is it a bit intrusive?

Student: Part time students might be ok, but with full time students, they might want to switch off.

Interviewer: Is there anything else you would like to add?

Student: I think it might be a good idea if you had a look through the schedule and sent reminders about exams or continuous assessments.
Appendix B.3. Interview with Full-Time Second-Year Degree Students

From a voice recording made on 8\textsuperscript{th} October 2007 of an interview with a focus group of second-year full-time undergraduate computing degree students about any potential concerns that may have arisen with the text messaging service and possible guidelines that should be observed when using it.

**Interviewer:** Ho do you feel about your instructor sending you text messages recently?

**Student:** It’s handy. Last year for instance, there were notes not up on Moodle (The Learning Management System) and I just sent you a text and they were up there. It’s handy for reminders as well for exams. If there was a test coming up the next day or a week before, I think you sent us a text last semester for that, so that was handy.

**Interviewer:** Would you ever find it intrusive or annoying in any way?

**Student:** I wouldn’t see it coming across that way. They’re always relevant to the course we’re doing.

**Interviewer:** You think that’s important?

**Student:** Yes.

**Interviewer:** What about privacy?

**Student:** It’s only a text message. It’s not going to do any harm. You’ve signed up yourself; you can easily get out of it.

**Interviewer:** Were you surprised when I gave you my number?

**Student:** You’re the first lecturer I’ve heard of that’s done this so far.

**Interviewer:** Did you feel under any pressure to join up, or was it free will?
Student: Free will. You handed out a piece of paper; you can put your number on it if you want. There was no pressure, you didn’t come checking, we just handed it back.

Interviewer: So you didn’t mind giving out your number as such?

Student: No. If we did, we wouldn’t have given it to you.

Interviewer: So you don’t mind receiving the messages?

Student: No, once they’re relevant to the course.

Interviewer: Do you think the text messages up to now have been relevant?

Student: Yes.

Interviewer: Do you think the messages should always be related to the course, or how about ‘have a nice weekend’, or ‘see you next week’ or is that pointless?

Student: Personally I think it should be sticking to the course.

Other Student: I don’t see the point in that. It doesn’t bother me; I just don’t see the point.

Other Student: I suppose with those kinds of messages, it does add a kind of personal touch. It improves the communication between student and lecturer. I personally don’t mind getting them and I suppose if you’re trying to make yourself more approachable to a group of students, it’s not a bad idea.

Other Student: You don’t know how people are going to react to that type of message, so I think it’s important to stick to the subject.

Interviewer: Would you feel nervous about replying or watch what you were saying or do you just feel relaxed and not too bothered?

Student: Not bothered; relaxed.
Interviewer: What about the number of the messages? Do you think there’s too many or too few?

Student: I think it’s fine. There has not been a lot recently; there was probably more last semester. It’s probably more important coming to the end of the semester with exam questions and stuff like that.

Interviewer: What about the cost?

Student: It’s minimal to the students. You don’t have to reply either.

Interviewer: What’s the maximum number of messages should be sent per week?

Student: We have two lectures a week, so five at most.

Other Student: I would agree with that. Anymore than that and you might be bombarded.

Interviewer: What do you think is the best time and the latest time that students should receive messages?

Student: I suppose no later than nine o’clock. You want to switch off around then so you don’t want to be getting text messages. Maybe not too much during the day as well, because everyone has lectures, if everyone’s phone goes off, it can be a bit distracting.

Interviewer: What about early in the morning.

Student: Something important anytime, but if it’s just a reminder, then not too early.

Interviewer: What about on the weekends?

Student: I don’t really mind. If something comes up, like we have class on a Monday so if you can’t make it to a lecture you can send a message.
Appendix C. Transcript of Interview with Programme Co-ordinator

Transcript of a voice recording made 20th February 2009 of an interview with the programme co-ordinator for the department of computing about their perception and experience of using a service to broadcast text messages to students for administrative purposes.

Interviewer: Thanks for volunteering to take part in this short interview about the use of a college system that sends information to students using text messaging. Some students I spoke with thought that the system was adopted in response to feedback they gave at a meeting of class representatives and other forums. Do you know anything about this?

Programme Co-ordinator: The system was brought in I suppose partly in response to feedback received from the Student Services Survey which is a survey that is circulated around the college to ask students to rate and provide feedback on the services offered by the college, for example, the IT department, the Library and the Student Services department and also as a response from the college to improve communication channels.

Interviewer: I believe from speaking with students that the college now has a system that can be used to send text messages to students in certain circumstances. Could you please describe the system and its operation to me?

Programme Co-ordinator: How I use the system: the system is called XIAM and how the system is used is the information is fed into it manually and a text message is typed in and is sent to the recipients. What I use the text messaging for specifically would be if a class was cancelled or if a lecture is unavailable or if a
continuous assessment is due or if a classroom has been changed. Only text messages that are relevant to the course or to the students are allowed. There is no personal text messaging allowed and it is only purely information, short and concise. The messages are broadcast messages and messages are not individually sent to a student.

**Interviewer:** When the system was first introduced how did you feel about it?

**Programme Co-ordinator:** I was delighted because it saves a lot of work for me. Traditionally if a classroom was swapped I would perhaps email all the students, perhaps call all the students, put signs up around the various areas of the college either on the door of the original room or the door of the new room and on the notice boards. So it used to take about 20 minutes to do this whereas now I can just text the students and this takes about 5 minutes. So it’s very useful.

**Interviewer:** Has the system impacted on your workload in any way?

**Programme Co-ordinator:** It has not increased my workload but it has actually made me work more efficiently. I suppose, where the work is involved is the setting up of the system. There are quite a few steps involved in sending a text message but once you know how to do it is fairly straight-forward. It is web-based.

**Interviewer:** When students receive a text message from the system do they know who is sending it?

**Programme Co-ordinator:** Because I am sending a class specific message I will say my name the Programme Co-ordinator for the School of Computing at the end of the text message so they are aware of whom it is coming from. So I would never send a text message without me signing off as myself.

**Interviewer:** Has your attitude towards the system changed in any way since its introduction?
**Programme Co-ordinator:** The more I use it the more user-friendly I find it.

**Interviewer:** Do you feel uncomfortable in any way about using the system to send text messages to students?

**Programme Co-ordinator:** No. As I said before it has made my life a lot easier, made my work a lot easier and made me work more efficiently. It is an efficient service and when it’s used within the constraints it was designed for specifically for class information I’ve no problem using it.

**Interviewer:** Have there been any problems with using the system?

**Programme Co-ordinator:** Well, there have been a couple of students who have said that they did not receive the text but I actually followed that with the IT department to double check the system to see if the text was sent. According to the system the text was sent and according to Quercus their mobile number was correct. So I enquired as to whether or not they had an older phone and whether this would affect them receiving the text or not. The IT department said it did not so I still don’t know why some texts are dropped now and then. A lot of students have said they wondered why they weren’t getting the texts but that was because they hadn’t given their mobile number. So a lot of students when they see the benefits want to participate in the service.

**Interviewer:** Do you think it has changed your relationship with the students in any way?

**Programme Co-ordinator:** I suppose they would because they know my name and they know my function. I suppose because I would be the only person I know of in the school of computing that would send class related texts.

**Interviewer:** Have you received any feedback from students about the system?
**Programme Co-ordinator:** Well no. Sometimes students will say to me that “I didn’t get a text message about that” so I think they expect a text now. So that’s the only feedback I’ve got. I have never got any negative feedback saying “Please don’t send me a text” or “I don’t want to get a text”. They have the option if they do not want to participate by going down to Student Services and saying that they do not want to be part of the SMS text messaging system and so their number is taken out. They don’t receive the text message and can only rely on email at that stage. So they are kind of limiting their information resources.

**Interviewer:** Do you send the same message through email or not.

**Programme Co-ordinator:** Yes. There are two ways I use to circulate information. I send it to their NCI email account and send the exact information by text. But the text message can only take 160 characters so I might not be able to get all the information in that text so I refer to that email in the text so that they can get more information.

**Interviewer:** Thank you for your time.
# Appendix D. Questionnaire on Student Perception of Use and Impact of Text Messaging Service

## Student Perception of Use and Impact of Test Messaging Service

### Section A

**Directions:** Answer each question by placing one tick only in the appropriate box, on a scale between 1 and 7 where:

- 1 = Definitely Not
- 7 = Very Much So

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you think that being in touch by text messaging with your lecturer is a good idea?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>2</td>
<td>Do you like receiving text messages from your lecturer?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>3</td>
<td>Would you like to receive more text messages from your lecturer?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>4</td>
<td>Were you surprised when the lecturer offered you a text messaging service?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>5</td>
<td>Do you enjoy using the text messaging service?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>6</td>
<td>Do you like receiving text messages about the module?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>7</td>
<td>Do you like receiving non-academic text messages from your lecturer?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>8</td>
<td>Do you think the contents of the text messages you receive from your lecturer are appropriate?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>9</td>
<td>Do you think the text messaging service has improved your attitude to your lecturer?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>10</td>
<td>Do you think the lecturer is more approachable as a result of the text messaging service?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>11</td>
<td>Do you think you are more likely to ask questions in class as a result of the text messaging service?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>12</td>
<td>Do you think you are more likely to informally chat with the lecturer as a result of the text messaging service?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>13</td>
<td>Do you think the text messaging service has improved your attitude to the subject?</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>14</td>
<td>Do you think the text messaging service has improved your</td>
<td>1 3 3 3 3 3 7</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has been beneficial to your relationship with the lecturer?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has improved the lecturer’s attitude towards you</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has improved the lecturer’s attitude towards the class</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has been beneficial to you?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has been beneficial to your class?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you like the subject more as a result of the text messaging service?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has increased your motivation?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has increased your engagement with the subject?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has increased your participation in class?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the fact that the text messages can be sent and received at any time and in any place is an advantage?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think that text messaging is an effective approach to support learning?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think you respond better to the text messages than you would to emails?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think text messaging is useful for the organisational side of learning such as announcements about room changes etc.?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you think the text messaging service has helped you in your learning?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Are you concerned about the potential cost of replying to the text messages?</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Do you feel that receiving text messages from your lecturer is intrusive?</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**Section B**

Please answer the following questions about your perception of the impact of the text messaging service giving your personal opinion in each case:
<table>
<thead>
<tr>
<th>Question 1.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In my opinion being in contact with the lecturer by text messaging is good/bad for the following reasons:</td>
<td></td>
</tr>
<tr>
<td>Reasons it is good:</td>
<td></td>
</tr>
<tr>
<td>Reasons it is bad:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In what ways (if any) do you think the text messaging service has been beneficial/detrimental to you and your education?</td>
<td></td>
</tr>
<tr>
<td>Ways it is beneficial:</td>
<td></td>
</tr>
<tr>
<td>Ways it is detrimental:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 3.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In what ways (if any) do you think the text messaging service has been beneficial/detrimental to your class in general?</td>
<td></td>
</tr>
<tr>
<td>Ways it is beneficial:</td>
<td></td>
</tr>
<tr>
<td>Ways it is detrimental:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 4.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In what ways (if any) do you think the text messaging service has improved/disimproved your relationship with the lecturer?</td>
<td></td>
</tr>
<tr>
<td>Ways it has improved:</td>
<td></td>
</tr>
<tr>
<td>Ways it has disimproved:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 5.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In what ways (if any) do you think the text messaging service has helped/hindered you in your learning?</td>
<td></td>
</tr>
<tr>
<td>Ways it has helped:</td>
<td></td>
</tr>
<tr>
<td>Ways it has hindered:</td>
<td></td>
</tr>
</tbody>
</table>
Question 6.
Are there any comments you would like to make about the text messaging service or this research study?
Appendix E. Consent Forms

Appendix E.1. Consent Form to Participate in Text Messaging Service

Consent to Participate in Text Messaging Service

Introduction
A text messaging service is being made available by your lecturer Mr. Paul Hayes at the National College of Ireland to provide support to students outside of class.

Participation
Participation in the text messaging service is purely voluntary. You have the right to withdraw at anytime or refuse to participate entirely without jeopardy to your relationship with the lecturer and your class status, grade or standing with the college. If you wish to withdraw your consent at any stage you need to inform your lecturer by letter, by email or by simply sending a text message with the keyword STOP. A list of guidelines for the use of the text messaging service is attached to this consent form.

Procedures
If you wish to participate in the service please complete and sign this consent form and return it to your lecturer.

Risks
There are no risks for participation in this service.

Confidentiality
All information including your mobile number and any text messages you send or receive will be treated in strictest confidence and kept in a secure place where they can be accessed only by your lecturer. If you withdraw your consent at any time your contact details and any messages they sent/received should be deleted from the system. The lecturer can use the contents of the text messages for future research publication, however all information that could be used to identify a participant will be removed beforehand.

I have read, understood, and received a copy of the above consent and a copy of the guidelines to be followed when using the text messaging service.

I desire of my own free will to participate in this text messaging service.

Name: ___________________________ Mobile Number: ________________

Programme: ________________ Year of Study: __________

Signature: ________________ Date: ________________
Appendix E.2. Consent Form for Research Study (Treatment Groups)

Consent to Participate in Research Study

Introduction
This research study is being conducted by Mr. Paul Hayes at the National College of Ireland to help improve the learning environment.

Procedures
You will be asked to complete 4 questionnaires in total. The first two questionnaires are designed to measure your perception of the communication style of your lecturer. The third questionnaire asks questions relating to your perceptions of the use of the text messaging service. The final questionnaire asks for some details such as your age, gender etc. purely for research purposes.

Risks
There are no risks for participation in this study. Feel free to answer openly and honestly. All information is confidential.

Benefits
There are no direct benefits to subjects. However, it is hoped that through your participation educational researchers will learn a bit more about how to enhance the learning environment.

Confidentiality
All information provided will remain confidential and will not be reported with any identifying information. All data, including consent forms and questionnaires, will be kept in a locked storage cabinet and only those directly involved with the research will have access to them. After the research is completed the consent forms and questionnaires will be destroyed.

Participation
Participation in this research study is voluntary. You have the right to withdraw at anytime or refuse to participate entirely without jeopardy to your relationship with the lecturer and your class status, grade or standing with the college.

I have read, understood, and received a copy of the above consent and desire of my own free will to participate in this study.

Signature: ________________________ Date: ____________________
Appendix E.3. Consent Form for Research Study (Control Groups)

Consent to Participate in Research Study

Introduction
This research study is being conducted by Mr. Paul Hayes at the National College of Ireland to help improve the learning environment.

Procedures
You will be asked to complete 3 questionnaires in total. The first two questionnaires are designed to measure your perception of the communication style of your lecturer. The final questionnaire asks for some details such as your age, gender etc. purely for research purposes.

Risks
There are no risks for participation in this study. Feel free to answer openly and honestly. All information is confidential.

Benefits
There are no direct benefits to subjects. However, it is hoped that through your participation educational researchers will learn a bit more about how to enhance the learning environment.

Confidentiality
All information provided will remain confidential and will not be reported with any identifying information. All data, including consent forms and questionnaires, will be kept in a locked storage cabinet and only those directly involved with the research will have access to them. After the research is completed the consent forms and questionnaires will be destroyed.

Participation
Participation in this research study is voluntary. You have the right to withdraw at anytime or refuse to participate entirely without jeopardy to your relationship with the lecturer and your class status, grade or standing with the college.

I have read, understood, and received a copy of the above consent and desire of my own free will to participate in this study.

Signature: ________________________ Date: _______________
### Question 1: In my opinion being in contact with the lecturer by text messaging is good/bad for the following reasons:

<table>
<thead>
<tr>
<th>Group</th>
<th>Reasons it is good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>It is good as I am well informed about the course and I always have my mobile with me</td>
</tr>
<tr>
<td></td>
<td>It is good, can contact lecturer at anytime especially if don’t have PC access at the time or cannot attend class due to emergency or unexpected appointments</td>
</tr>
<tr>
<td></td>
<td>Good to be kept in the loop, always kept good communication</td>
</tr>
<tr>
<td></td>
<td>Good because it helps to keep us up to date. More friendly and natural relation with your lecturer</td>
</tr>
<tr>
<td>Group E</td>
<td>It’s a good way to find out about class changes and test times, etc</td>
</tr>
<tr>
<td></td>
<td>I think it’s a great idea, all lecturers should do it, if you have a problem you can have it solved easily</td>
</tr>
<tr>
<td></td>
<td>Revision purposes, room changes, assignments/exams, if a class is postponed or if you or lecturer are out or late</td>
</tr>
<tr>
<td></td>
<td>If you have any questions about the class you can text your lecturer and get the answers your looking for</td>
</tr>
<tr>
<td>Group H</td>
<td>Keep in contact with the lecturer anytime</td>
</tr>
<tr>
<td></td>
<td>Easy to get info quickly</td>
</tr>
<tr>
<td></td>
<td>You can ask him questions no matter where you are</td>
</tr>
<tr>
<td></td>
<td>Note of room change</td>
</tr>
<tr>
<td>Group G</td>
<td>Building a relationship</td>
</tr>
<tr>
<td></td>
<td>The Lecturer is reachable and able to answer the questions when I'm in need for an answer</td>
</tr>
<tr>
<td></td>
<td>Using today's technology to keep in touch. A great way to keep students informed &amp; up to date</td>
</tr>
<tr>
<td></td>
<td>Shows the teacher cares for the students, keeps the students in &quot;College Mood&quot; even when they're elsewhere</td>
</tr>
<tr>
<td>Group C</td>
<td>&lt;no reasons given&gt;</td>
</tr>
<tr>
<td>Group E</td>
<td>Nothing bad, all good</td>
</tr>
<tr>
<td></td>
<td>It wastes my credit</td>
</tr>
<tr>
<td>Group H</td>
<td>Usually get text messages when I'm in the cinema</td>
</tr>
<tr>
<td></td>
<td>Sometimes texts are not relevant to course</td>
</tr>
<tr>
<td>Group G</td>
<td>Cost for lecturer. Sometimes it can be difficult what to say in the texts</td>
</tr>
<tr>
<td></td>
<td>Timing of texts</td>
</tr>
</tbody>
</table>
**Question 2:** In what ways (if any) do you think the text messaging service has been beneficial/detrimental to you and your education?

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has been beneficial</th>
</tr>
</thead>
</table>
| **Group C** | Yes for the simple reason that my lecturer informs me on what's going on to give me time to prepare for the class (module)  
It has made me feel closer to the lecturer, more comfortable therefore I am more comfortable asking questions in class, or outside of class about my course. I feel I have benefited greatly from this.  
Reminders for lectures, changes for rooms, it is nice to have such a nice rapport with Paul, it will be a shame to not have him in our class  
Beneficial not in learning the subject but in remembering and sometimes incentivising (sic) to attend class |
| **Group E** | It helps if I've any queries at home, when studying. If I cannot attend or if I'm running late  
It is good because the lecturer asks you questions in texts and that refreshes your memory about the class  
Learning questions  
It's easy to keep in touch with the lecturer if you need info about the course so it has been beneficial |
| **Group H** | It is beneficial as I could contact the lecturer with ease if I didn’t understand everything  
Let you know what coming up in class in advance so you can prepare  
Gets you participating in class more because you know the lecturer better  
More in touch with lecturer |
| **Group G** | In the organisational levels as reminders to tutorials and reminders to exams, etc  
Kept in touch/up to date & informed  
Because it makes me think ahead of the class and reminds to do tutorials before the class  
Has motivated me more to come to class, has improved my attitude towards college and subjects |

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has been detrimental</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group C</strong></td>
<td>&lt;nothing specified&gt;</td>
</tr>
<tr>
<td><strong>Group E</strong></td>
<td>All good</td>
</tr>
</tbody>
</table>
| **Group H** | Because the texts are not relevant to the course  
Not always text at appropriate time |
| **Group G** | Sometimes texts may not be sent at the right times  
None really |
### Question 3: In what ways (if any) do you think the text messaging service has been beneficial/detrimental to your class in general?

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has been beneficial</th>
</tr>
</thead>
</table>
| Group C | It has improved the class’ relationship with the lecturer therefore we have a more comfortable atmosphere in class and learning is better then.  
 Communication is always a benefit  
 Very beneficial  
 Better communication with the class. Some lecturers barely send you emails. |
| Group E | Helps everyone who has difficulties with questions  
 Getting to know the lecturer  
 Helps us keep in touch with lecturer if needed  
 Getting class announcements if class is cancelled and stuff like that |
| Group H | More relaxed attitude in class  
 To encourage the class to know about the tutorial/test  
 It makes some people feel more involved  
 Brought the lecturer closer to the class |
| Group G | Became a talking point  
 Bringing the class closer together, everybody is informed instantly  
 Because everyone benefits from it. The class has a higher attendance and thus can meet together often  
 Has improved communication big time. Has improved attitude |

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has been detrimental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>&lt;nothing specified&gt;</td>
</tr>
<tr>
<td>Group E</td>
<td>Less credit</td>
</tr>
</tbody>
</table>
| Group H | Not course related  
 Not always text at appropriate time |
| Group G | Questions were raised about the ultimate point of the SMS exercise  
 Not detrimental |
**Question 4:** In what ways (if any) do you think the text messaging service has improved/disimproved your relationship with the lecturer?

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has improved relationship</th>
</tr>
</thead>
</table>
| Group C | Having our lecturer's mobile number makes me feel close and communicate with him  
          It has improved my relationship with the lecturer because I don’t only relate him to standing in front of the class dictating notes. I see him as someone I can communicate with  
          It hasn’t disimproved the relationship, it has improved it, it was nice to talk about texts in class  
          Feel communication is very high-level. Good service to students who are not great at one-to-one meetings or in front of class |
| Group E | It makes you warm to him, he is only trying to help you advance your education  
          Get on better  
          The lecturer is more approachable  
          Its easier to talk to lecturer as you don’t feel as unfriendly with them |
| Group H | It has improved as it is now easier to talk to the lecturer outside class  
          Makes me feel closer to the lecturer  
          It enables you to chat more freely about the subject with him  
          Got to know him better |
| Group G | It reduces the barrier to approach the lecturer, gives a feeling that the lecturer cares about the student  
          Because we are in touch more often, it did improve the relationship in a positive way  
          See the lecturer closer to me and the class, see the lecturer as if he is taking care of the class 24/7  
          Because, I can communicate my immediate problems to the lecturer |

<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has disimproved relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>&lt;nothing specified&gt;</td>
</tr>
<tr>
<td>Group E</td>
<td>&lt;nothing specified&gt;</td>
</tr>
<tr>
<td>Group H</td>
<td>None</td>
</tr>
</tbody>
</table>
| Group G | Indifferent  
          None |
<table>
<thead>
<tr>
<th>Group</th>
<th>Ways it has helped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>Always remind me to study (revision) before the class</td>
</tr>
<tr>
<td></td>
<td>It has helped my learning because I don’t check my email as often as I have my</td>
</tr>
<tr>
<td></td>
<td>mobile so any changes in the module or classes comes to me in real time so I’m</td>
</tr>
<tr>
<td></td>
<td>up to date on my course</td>
</tr>
<tr>
<td></td>
<td>Encouragement (positivity)</td>
</tr>
<tr>
<td></td>
<td>It hasn’t</td>
</tr>
<tr>
<td>Group E</td>
<td>When I was sick I was able to tell him and he was able to tell me what I was</td>
</tr>
<tr>
<td></td>
<td>missing</td>
</tr>
<tr>
<td></td>
<td>Revision</td>
</tr>
<tr>
<td></td>
<td>No effect</td>
</tr>
<tr>
<td></td>
<td>Again can ask question outside of class time</td>
</tr>
<tr>
<td>Group H</td>
<td>Helped motivate you more for class</td>
</tr>
<tr>
<td></td>
<td>Can get answers when studying at home</td>
</tr>
<tr>
<td></td>
<td>Provides tips and reminders</td>
</tr>
<tr>
<td></td>
<td>He lets us know when work/solutions have been added to Moodle</td>
</tr>
<tr>
<td>Group G</td>
<td>It help occasionally as a gentle reminder</td>
</tr>
<tr>
<td></td>
<td>It has motivated me into attending lectures &amp; seeing the lecturer as a person</td>
</tr>
<tr>
<td></td>
<td>Reminded me with tutorials and exam timetable</td>
</tr>
<tr>
<td></td>
<td>Indifferent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
</tr>
<tr>
<td>Group E</td>
</tr>
<tr>
<td>Group H</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
**Question 6:** Are there any comments you would like to make about the text messaging service or this research study?

<table>
<thead>
<tr>
<th>Group</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Group C | I think text messaging should be applied to all modules.  
Always good to research. It is never a waste of time  
Nope, thank you  
Good service to students, improved communications, pity others don’t have this service as cases of high lack of communication. |
| Group E | I think the text messaging service is the best idea the college has had. I think all lecturers should do it, it would help with all modules  
I think it’s a very good idea  
No and thank you!!!  
I think it’s a very good idea |
| Group H | Its easier to communicate by text rather than email. And he's meteor so its free to text him  
Good initiative and has a lot of potential  
No comment  
Its good |
| Group G | It is very innovative research study  
The area of text messages should be developed further for education/college purposes  
A good topic & a different approach in dealing with lecturer/student communication  
I just want to say that it's a great idea! Keep up the good work |