



JISC Final Report

Title Page

MeLAS

Mobiles Enhancing Learning and Support

Author: Dr Paul Brett

Contact: P.Brett@wlv.ac.uk

July, 2008

Table of Contents



JISC Final Report.....	1
JISC Final Report.....	1
Title Page.....	1
Table of Contents.....	1
Acknowledgements.....	2
Background.....	4
Aims and Objectives	5
Methodology	5
Approaches to the technical work.	6
1. Creation of the SMS software and server set up.....	6
2. Migration of mobile phone numbers for use by the software.	6
3. Technical implementation of the user interface.....	6
Project Steering group.....	6
Approaches to Pedagogic Design.....	7
Designs of the three text message types	7
1. Push messages:	7
2. Formative assessment questions, of which there were three types.	7
3. Text Conference messages.	8
Approaches to the use of the system with students.....	8
1. Equal opportunities	8
2. Student choice to opt in and opt out.....	8
3. Engaging with students.	8
4. Staff development.....	8
5. Timing of messages.	8
Evaluation.....	8
Implementation	9
1. Recruitment of participating staff.....	9
2. Staff development sessions	9
3. Support for the system	9
4. Data collection for the evaluation.....	9
5. Dissemination of the project so far.....	9
Outputs and Results	10
Outcomes.....	11
Conclusions, Implications and recommendations	12

Ubiquitous need for SMS communications	12
Technical development by message suppliers	13
Learning and teaching value	13
Text message rubric.....	13
Data Protection.....	13
Equal opportunities.....	13
Technological future	13
Reminders for quizzes.....	13
Negotiate parameters of use with students.....	13
Further text message types.....	14
Consideration of other interactive uses of SMS	14
Message length	14
Timing of messages	14
Borrow pedagogy from what we already know	14
Don't proliferate places for holding student information.....	14
References.....	14
Appendixes	16
Appendix A - Evision to PebblePad Data Transfer	16
Appendix B - SMS Sever set up.....	17
Appendix C - User interface and integration of components	20
Appendix D - Final Budget	22
Appendix E - Sequence of an example text message quiz.....	23
Appendix F - Generic letter sent to students from staff about the text messaging services.....	24
Appendix G - Staff and student questionnaires, copies of the data collection instruments	25

Acknowledgements

This project was funded by JISC under the e-Learning innovation programme.

The project wishes to thank Professor Alison Halstead who along with John Traxler conceived this project and worked on it for its first year. It would like to thank Kris Popat who worked as freelance on the project and developed the software and provided the technical support for this. It would like to thank PebbleLearning for their work in integrating the software into PebblePad, creating the staff user interface and for technical support. It would like to thank Matt Green for his work on the data collection and analysis. We would like to thank Steve Barker in ITS for his work in creating the system which joined data from our student management system (e-vision) up with the project's software. It would like to thank JISC for funding this project and especially Heather Williamson for her support. Finally, it would like to thank the 27 members of University staff who learnt how the system worked and used it with their students, and all the students who gave us feedback.

Executive Summary

This project set out to investigate the issues in an institution wide implementation of SMS-based technology to support teaching and learning activities in the University of Wolverhampton. There had been no large-scale studies reported on the institution wide use of SMS, nor on the use of SMS for formative assessment and feedback with university learners, nor for the use of SMS for collaborative discursive learning tasks.

To be able to achieve this three aspects of technical work were accomplished. The design and creation of software tools and a server set up to render such texts. The automatic use of this system of students' mobile phone numbers held on our student management system (eVision) and the creation of a user interface bringing these two together.

The project used an expert user group to design the SMS tools for learning and teaching activity. It created three types of SMS message. These were: one way (staff -> learner) communication, formative assessment with feedback, and a collaborative learning discursive tool. The formative assessment tools included three types of questions; True / False, multiple choice and free text response. This group also designed the parameters of use for the system with students.

Following bespoke staff development, the tools were used by 27 staff interacting with 938 different students and a total of 11,522 texts were sent. 310 quizzes and 114 conferences were set up. A full multimedia rich overview of the system in action can be found at the project web site. The project used questionnaires and focus groups of staff and student users, plus data from server logs to inform its outputs.

The project has produced the open source software to implement such SMS learning and teaching interactions. In addition, it has produced four reports on (i) the issues surrounding implementation of SMS within a large institution and a set of recommendations for effective implementation, (ii) the staff development needs to utilise SMS for administrative and learning activity, (iii) a summary paper on learner experiences of SMS based learning and teaching using the data gathered from students who participated, and (iv) a summary paper on the learner experience of the use of SMS for administrative purposes. These reports are on the project web site.

The main conclusion of this project is that universities and their students will benefit from institutional wide use of communication via SMS and that the use of SMS for specifically learning and teaching activity shows great promise, but needs further use and investigation.

Background

This project has explored a previously uncharted area of mobile learning, the use of large-scale SMS for learning and teaching activities. Given the saturation of mobile phone ownership by current HE students, at levels of 97% in University of Wolverhampton, and the familiarity of the use of the technology, it seemed that HE could make more use of text messaging to engage its learners.

Whilst projects using mobile phones were apparent in the sector, these were in general on a very small scale, and involved manual transfer of mobile phone numbers etc. There were no accounts of institutions having made automatic access to students' mobile phone numbers available to all academic staff, in ways which complied with data protection legislation. Nor were there institutions who also had the necessary infrastructure, software and finance to engage students in learning and teaching via SMS. Specifically this project set out to create and explore the value of SMS for learning and teaching. It used: one way (staff -> learner) communication, formative assessment, and collaborative learning all via SMS.

Interest in the use and potential of mobile learning opportunities (e.g., Attewell, 2005), has been growing in line with the emergence of a variety of technologies which might facilitate this, e.g., PDAs, iPhones and mobile phones. Traxler and Kukulka-Hulme (2005) propose that HEIs offering m-learning as an element of its blended learning provision may benefit in a number of ways. They will be able to reach new types of learners e.g., access students who are also working, and increase the amount of learners using the same resources, offering both flexibility of engagement and students the choice of 'time, place, and pace' for their learning.

Previous work on the use of SMS suggests there may be a variety of learning potentials for its use in educational settings (Attewell, 2005; Traxler & Riordan, 2003). These studies have shown the students' experience to be positive for: administrative communications (Naismith, 2007; Griffiths and Hmer, 2004), supporting the transition into university (Harley et al. 2007; Stone, 2004), contacting academic staff (Horstmanshof, 2004), for language learning (Librero et al, 2007; Levy & Kennedy, 2005; Thornton & Houser, 2005) and for increasing interactivity in classroom sessions (Martínez-Torres et al, 2007; Cheung, 2005; Markett et al, 2006).

This project extends this body of research into the area of mobile blended formative assessment and collaborative learning. As yet, there has been no systematic and structured use of blended SMS-based formative assessment nor SMS-based collaborative learning with students. There has been no staff development focussed upon best practice in creating SMS-based objective questions for formative assessment or discursive tasks. These approaches had not been trialled across a full range of disciplines. This project aimed to investigate all these areas of blended m-Learning practice

There are several areas of the learning and teaching literature upon which this project is based. The use of formative assessment with feedback has long been viewed as an essential aspect of University learning provision, it being a key mechanism for enhancing learning (Biggs, 2003). The meta-analysis of studies of the use of formative assessment with feedback by Black and William (1998) showed that it unfailingly led to learning gains, no matter what the educational setting. Further, Nichol and Macfarlane-Dick (2006) suggest that formative assessment should be embedded in HEIs' strategic approaches to improving student learning.

Computer based formative assessment, using objective question types, has also been the subject of investigation (e.g., Cook, 2001). Most of the studies have demonstrated a correlation between achievement of learning outcomes and exam results with engagement in computer-based formative assessment performance (e.g., Clarke et al, 2004; Morris and Walker, 2006). Objective questions with feedback were used in this project. The work of Bull (2004) demonstrates how objective questions can be designed to engage learners with more than factual and procedural knowledge and invoke use of higher order cognitive skills. Formative assessment with feedback opportunities is especially interesting to the sector given the outcomes of the National Student Survey which indicate this is an area of universal dissatisfaction amongst the student body.

This project then was needed to add to our understanding of the potential of SMS for learning and teaching in HE in the following ways:

- (i) what are the issues in and implications of making SMS available universally across an institution;
- (ii) what are the issues in the design, creation and use of a system for SMS which focus on learning and teaching interactivity?
- (iii) what are the issues in staff development for the use of blended SMS based learning?
- (iv) what are students' perceptions of the value of SMS for blended learning?
- (v) what are staff's perceptions of the value of SMS for blended learning?

These issues had never been explored.

Aims and Objectives

The project's aims and objectives in the original proposal were to;

- 1) Assess the usefulness of administrative information distributed by SMS to students studying at level 1 in HE.
- 2) Evaluate a range of subject based learning and teaching technologies by SMS from the staff and student perspective
- 3) Identify the staff development needs of using SMS texting for administrative and academic work
- 4) Assessment of the impact of this intervention on retention and progression.
- 5) Produce guidelines on the purposes and benefits of SMS texting at level 1 in HE
- 6) A review of the issues of implementing SMS within a large institution and a set of recommendations on effective implementation.
- 7) Embed SMS messaging within the institutional ePortfolio
- 8) Generate a technology toolkit for groupcasting media nuggets.

The planned course of the project, and the aims and objectives, were negatively affected by the project's main technology partner, UltrabLab at the Anglia Ruskin University unexpectedly undergoing a major restructuring and redundancy programme. UltrabLab were going to be responsible for the creation of the software which enabled the different types of texts to be sent.

In February, 2007 a meeting was held with University of Wolverhampton, Paul Bailey and Heather Williamson about how to restructure the project. It was decided to use a consultant to carry out the work originally allocated to UltraLab. Five months of the original project time was lost. This has had a major impact on the project's aim No. 4 (above), in that by the time the software was fit for purpose, February, 2008, there was not time to be able to include this as part of the evaluation as the SMS tools were only used in Semester 2 2007/8.

The project restarted on April 1st 2007 with the employment of the consultant and the purchasing of the server.

The project leader, Professor Alison Halstead, subsequently left the University to take up a PVC role at the University of Aston in July 2007, and the project was thereafter managed by Dr Paul Brett.

The creation of reliable software also took longer than anticipated and was only fit for purpose in February 2008.

Apart from aim No. 4, all other project outcomes have been met.

Methodology

It helps to visualise the approaches taken by this project if one separates the many strands of work into technical, pedagogic, and use with students.

Approaches to the technical work.

1. Creation of the SMS software and server set up.

This aspect of the work was originally to be carried out by UltraLab, and after their exit from the project this was taken on by a consultant (Kris Popat) with the necessary experience and expertise to carry out such a coding project from scratch. These did not include a company who were SMS providers of SMS systems for education, e.g., Edutext. The full details of Kris' approach and technical design are in Appendix A and the links to the open source software created for the project can be found at the following addresses:

<http://opensource.krispopat.co.uk/melas/GroupMessagingServer.zip>

<http://opensource.krispopat.co.uk/melas/GroupMessagingClient.zip>

This technical work took longer than anticipated. The software was tested over semester one, 2007 by a group of five University champions, individually initially, and then with cohorts of students. Technical hitches were fed back to the consultant and we arrived at a stable product for mass use by February 2008.

The project also had to house the server outside of main University provision as it was using open source software and not based upon the Windows platform.

2. Migration of mobile phone numbers for use by the software.

The University solicitor advised that we were to create a system which did not reveal phone numbers to staff or to students to comply with data protection legislation. In addition, University Registry advised that it did not want students entering their mobile numbers in yet another place, just for use in this project, as a large effort is underway across the institution to use only one source of centralised data. It was thought that student entry of mobile phones in a place other than our central student records system would encourage data proliferation and students might think we had their mobile number for general use e.g., emergencies, through its provision for this project. In addition, when using this SMS system with students it was an opportunity to encourage them to ensure their personal data was correct on eVision.

Given these parameters, the work on feeding through student mobile phone numbers held in eVision to make them available for use in this project needed to be undertaken by our I T Services. They had knowledge and experience of working with eVision and would be bound by the Data Protection Act, as they would need access to students' eVision personal data.

This work was carried out by Steve Barker and his account of how this was achieved is included as Appendix B.

3. Technical implementation of the user interface.

The University does not use open source software nor host software not on the Windows server platform. Thus a partner was needed to implement the web interface for staff to create groups of their students who were to be texted, and to write the SMS messages and SMS learning materials. PebbleLearning, a supplier of ePortfolio systems, have co-operated with the University for many years, and were only too pleased to be involved. PebblePAD already linked into the University's LDAP and had functionality which enabled creation of groups of students.

As this was a project, and not a sanctioned University system, access to the setting up of student groups and the web interface for writing messages, questions and discussions, was through a version of PebblePAD housed on a University test server, not on the fully operational version of PebblePAD.

The user interface was created by PebblePAD and an account of this technical work is included as Appendix C. This had to incorporate the pedagogic design principles as out lined below.

Project Steering group

For decision making on the systemic and pedagogic issues which this project entailed a working group of PebbleLearning, 3 University TSL Co-ordinators, namely Linsey Duncan-Pitt, Jon Bernardes,

and Brian Penfold, together with John Traxler the Director of the Learning Lab and an internationally recognised expert in mobile learning, was formed. This group met 5 times and was involved in:

- i) testing of the software
- ii) designing the message sequencing
- iii) creating protocols for engaging its use with students
- iv) using the systems with students

Approaches to Pedagogic Design

The project aimed to explore the use of SMS for learning and teaching. The decision about the types of interactive text messaging services would be needed was taken early in the project. Given the importance of formative assessment with feedback (Biggs, 2005; Black and William, 1998) this was a prioritised service. In addition, collaborative learning opportunities are seen to be beneficial in a virtual learning environment (Salmon, 2002) and this became the third interactive message type which was authored.

Designs of the three text message types

The way in which the text messages were to be experienced by learners had to be designed and the steering group decided upon the following designs for each type of message.

1. Push messages:

These needed to automatically include the name of the tutor who sent them and that the tutor would not receive any reply. We also extended the length of the messages so that we could send messages with 5 texts length. So one text message is usually 160 characters long, we extended the system's capability so that we could send messages which were up to 800 characters in length.

A movie showing how this is done from the tutor viewpoint is available from

<http://www.wlv.ac.uk/default.aspx?page=16887>

2. Formative assessment questions, of which there were three types.

Tutors could set sets of questions including all three message types. The experts group recommended use of no more than five questions per set, and users settled on 3 as a maximum. This was because of the amount of interactions involved. An example sequence of quiz messages is shown in Appendix E.

A movie showing a sequence of messages from the students' viewpoint is available from
<http://www.wlv.ac.uk/default.aspx?page=15235>

A movie showing how staff set up a sequence of quiz questions is available from
<http://www.wlv.ac.uk/default.aspx?page=16887>

a) True / False questions:

A movie showing how staff set up a true / false question is available from
<http://www.wlv.ac.uk/default.aspx?page=16887>

b) Multiple choice question

A movie showing how staff set up a multiple choice question is available from
<http://www.wlv.ac.uk/default.aspx?page=16887>

c) Free text response question

A movie showing how staff set up a free text question is available from
<http://www.wlv.ac.uk/default.aspx?page=16887>

3. Text Conference messages.

In this mode, one SMS message goes to all the students in a group. Thus, if a student contributes a message, this goes to all those in the group.

A movie showing how staff set up a conference is available from <http://www.wlv.ac.uk/default.aspx?page=16887>

Approaches to the use of the system with students

Thought had to be given to the following issues with regard to how the SMS system was to be used with the students. The experts group decided the following:

1. Equal opportunities

All students who did not have a mobile phone or who did not have a number in the system were sent an e-mail by default to their University e-mail address. This applied for all 3 message types.

2. Student choice to opt in and opt out

PebbleLearning included a function which allowed learners to use their ePortfolio to opt out of receiving text messages via a web page. An explanation and movie about students could do this can be found at <http://www.wlv.ac.uk/default.aspx?page=16887>

To preserve the accuracy of centrally held data, students were not encouraged to take their number out of eVision.

We also built in a STOP function so that students could reply to any text sent from the system with these four characters and then did not receive any further texts.

A worksheet and a movie were prepared to show students how to ensure that they had the correct mobile phone number in the correct field in eVision. The worksheet and movie are available from <http://www.wlv.ac.uk/default.aspx?page=16887>

3. Engaging with students.

The group decided that full information about the service, costs, and information about to opt in and out needed to be given to students in advance of use. A copy of this letter is included as Appendix F.

4. Staff development

The group decided that staff development sessions needed to be designed so as to include pedagogic rationales and examples of how the three services could be used.

5. Timing of messages.

The expert users group decided that the system should only be open to send and receive messages from 8am through to 9pm. This was to avoid any anti-social use of the system. The system thus became locked outside of these hours, although messages were stored and subsequently released at 8am.

Evaluation.

The evaluation of the project uses the following datasets:

1. Logs from the server about messages sent and received.
2. Questionnaires to students - paper and electronic.
3. Three thirty minute focus groups with groups students
4. Questionnaires given to staff

Ethical clearance was obtained on April 23rd, 2008.

The data collection instruments used with staff and students are included as Appendix G.

The data collection was done in May and June, 2008

Implementation

This section describes the implementation of the project from January, 2008. Implementation has been interpreted as use of the systems with students

1. Recruitment of participating staff.

The University e-Learning co-ordinator put out a call via e-mail as did School TSL Co-ordinators for any staff who were interested in using the system in semester 2, 2008. It was explained that there was an opportunity to be involved in an exciting project using text messages. This call resulted in 42 staff coming forward, being given administrative rights to enable them to use SMS, and thus be able to use the system with their learners.

2. Staff development sessions

Ten staff development sessions were run over our three campuses and were attended by 42 staff. The slides used can be found at:

The sessions included training in how to use the system, button pushing and ideas about how to use it. In the sessions all staff set up the groups of students who they intended to use the system with. It was important to include pedagogic advice to staff and practical ideas for use of the system. As there is no mature pedagogy for SMS, nor for SMS formative assessment, nor SMS conferencing, the trainer used ideas from virtual learning and teaching. Ideas of note were:

What learning can be done with Push Messages – message type 1

- summary of an earlier face to face session
- reminder about what topics were covered
- overview of an issue / idea / theory students found tricky
- an overview of what about a future session will be about
- key references for students to follow up on a topic covered
- tasks to be done pre/post a session
- relating a current news item to issues being studied
- revisiting key definitions
- worked examples

For the formative assessment questions we decided on batches of no more than 5 individual questions. Advice about feedback included that it should include, (i) what the answer is, (ii) why it is the answer, and (iii) what to do if you don't understand.

For text conferences advice concentrated on netiquette and staff contributions as being motivating for student engagement.

3. Support for the system

The University e-Learning Co-ordinator who was leading the project made himself available throughout the project for telephone support for staff using the system.

4. Data collection for the evaluation

The design of the data collection instruments and the methodology were handled by Mathew Green, John Traxler and Paul Brett. The timescales for collecting data on student staff experiences over a semester were tight, and data collection happened in May and June. The data was analysed by Mathew Green who was able to use his computing skills to extract data from the server logs. The team make no claims about the rigour of the data collection methodology, and advise that this is '*grabbed*' data.

5. Dissemination of the project so far

To date two presentations have been given at external conferences about the MeLAS project as follows:

Brett, P. A. (2008) *The large scale implementation of SMS for learning and teaching*. Third International Blended Learning Conference 2008: 19 June 2008 University of Hertfordshire, De Havilland campus, Hatfield, UK.

Brett, P. A. (2008) *Formative assessment and feedback using SMS*. July 3rd. HEA Conference, Harrogate, UK

A paper will also be given ALT-C in September, 2008

Outputs and Results

The end result of the project was that we developed a working SMS system, which can be used by any member of staff with any students, in any type of groups, without the need for exchange of mobile phone numbers. We also developed and used software which afforded us to engage in learning and teaching interactions, namely (i) communicate with students, (ii) set formative assessments with feedback, and (iii) use SMS for text conferences.

Quantitative data – brief overview

A quick overview of the quantitative data from the project shows that:

- 938 different students received SMS from the system, from some 27 staff, and a total of 11,522 texts were sent.
- 73 STOP messages were received from students.
- 310 quizzes and 114 conferences were set up
- 1,098 responses by students to tutor set Quiz Messages were received
- 212 messages to conference were received

The breakdown of the times at which tutors sent texts is below. It shows that 11 – 1pm and 3pm to 5 pm were the most popular times.

Time	No. of texts sent	Time	No. of texts sent
07:00 – 07:59	477	13:00 – 13:59	635
08:00 – 08:59	486	14:00 – 14:59	878
09:00 – 09:59	596	15:00 – 15:59	1,470
10:00 – 10:59	954	16:00 – 16:59	1,135
11:00 – 11:59	1,394	17:00 – 17:59	716
12:00 – 12:59	1,792	18:00 – 18:59	611

The projects' experience enables us to make some important recommendations to institutions (see final section and the guidelines pages on the Melas web site) who are considering implementing SMS across their universities and further education colleges.

There is a project website containing a rich picture of the texting service in operation using multimedia is at: <http://www.wlv.ac.uk/default.aspx?page=15227>

Outputs in bid	Mode of output, and any changes, noted as of August 2008
Guidelines on the purposes and benefits of SMS texting at level 1 in HE	Guidelines available on Melas Website -
A technology toolkit for groupcasting media nuggets	Available from: http://opensource.krispopat.co.uk/melas/GroupMess

	agingServer.zip http://opensource.krispopat.co.uk/melas/GroupMessagingClient.zip
A review of the issues surrounding implementation of SMS within a large institution and a set of recommendations on effective implementation	A set of guidelines are available from the MeLAS website at
An evaluation paper on the impact of SMS intervention on retention and progression based round the five level one modules	As the project has not been running over a long period we have not been able to evaluate any impact or affect on retention.
A paper on the staff development needs to utilise SMS for administrative and learning activity.	<p>This was assigned to be a peer reviewed journal publication, which as the data has only just been collected and analysed has not yet been written.</p> <p>There is a set of guidelines and staff development planning sessions on introducing staff to SMS - on the Melas web site.</p>
A paper on comparison of learner experiences of SMS based learning and teaching	<p>This was assigned to be a peer reviewed journal publication, which as the data has only just been collected and analysed has not yet been written.</p> <p>There is a summary paper on learner experiences of SMS based learning and teaching using the data gathered from students who participated - on the Melas web site.</p>
A paper on the learner experience of the use of SMS for administrative purposes	<p>This was assigned to be a peer reviewed journal publication, which as the data has only just been collected and analysed has not yet been written.</p> <p>There is a summary paper on the learner experience of the use of SMS for administrative purposes on the project web site.</p>

The reports on the project website included the analysis of the qualitative data.

Outcomes

This project has been invaluable to the community in that has been the first to (i) implement, and explore the issues involved in, University-wide use of SMS and (ii) to have explored the use of SMS for learning and teaching activity.

The project's aims and objectives are listed in numerical order below, followed by a brief summary of the outcomes;

- 1) Assess the usefulness of administrative information distributed by SMS to students studying at level 1 in HE.

This was achieved and a system built to send such messages. As can be seen from reading the summary paper on the learner experience of the use of SMS for administrative purposes on the project web site, all students found this highly valuable.

- 2) Evaluate a range of subject based learning and teaching technologies by SMS from the staff and student perspective

This was achieved and a report about these is available from the project web site.

3) Identify the staff development needs of using SMS texting for administrative and academic work

Like the use of any technology, staff development needs are twofold, how to use the technology and best practice and ideas for its integrated use in a blended learning situation. The challenge in this project was that there had been no previous uses of SMS for learning and teaching and so there was no pedagogic orthodoxy to fall back on. The pedagogic aspects of the staff development in the use of the three SMS tools for learning and teaching were as follows. For the push message type, which staff would use of administrative purposes and communication of essential information, this message type can still be used for one communications on module related content. The staff development sessions provided a variety of ways this could be done. It was suggested that key references, the main points of a face to face session, a definition of a difficult concept, issues to think about before a session, and key between sessions work would be useful to put in a text message.

4) Assessment of the impact of this intervention on retention and progression.

The project was not able to tackle this issue.

5) Produce guidelines on the purposes and benefits of SMS texting at level 1 in HE

These guidelines have been produced and are on the Melas website at : <http://>

6) A review of the issues of implementing SMS within a large institution and a set of recommendations on effective implementation.

This review has been produced and is on the project website:- <http://>

7) Embed SMS messaging within the institutional ePortfolio

This has been achieved and was necessary to carry out the project.

8) Generate a technology toolkit for groupcasting media nuggets.

This has been created and made available as an open source artefact.

The experience enables us to make some important recommendations to institutions who are considering implementing SMS across their universities and further education colleges – see final section of this report and the project web site.

When this project started, the interactive teaching and learning tools were not freely available. It maybe two years later that these will be provided free by text message suppliers. In addition, on reflection it might have been better to develop these in conjunction with a company which supplied text messages.

The late delivery of the SMS tools meant that we only had one semester to trial its use with learners. Ideally, a year period of use would have enabled us to collect information on (i) staff development, (ii) curriculum integration, (iii) staff and student experiences, and then use this to feedback into our approach, and refine it. We only had one shot at its use with learners, and a second semester's use would have enabled us to integrate it in an improved way, based on experience.

Conclusions, Implications and recommendations

The conclusions, recommendations and implications of this project are:

Ubiquitous need for SMS communications

All Higher and further Education institutions need to have a system to send SMS messages to students for administrative purposes. This might include cancelled lectures, assignment deadlines, reminders about what to bring, room changes, tutorial groupings etc. This was highly valued by the

students who participated in this project. University of Wolverhampton is taking this forward and will have an institution-wide system for administrative use by September 2008.

Technical development by message suppliers

In the development of any bespoke teaching and learning SMS software, it might be worth considering using the text message suppliers development kits or engage the company in developing the SMS software you need. Starting from scratch as we did, is very time consuming.

Learning and teaching value

The picture on the use of SMS for teaching and learning issues is not clear, with roughly a 50/50 divide of staff and students on its value. More work is needed and more focused use of these tools within a blended learning curriculum. The project took a scattergun approach, in that it handed it over to staff, with some training, and the issue of its use in relation to module learning outcomes and its use in a more systematic way in the curriculum was not considered. Those who did use it as a weekly, regular adjunct to face to face sessions drew more positive student evaluations.

Text message rubric

Text message rubric is vitally important. Consideration needs to be given to how the sender's name is included, and how instructions for responses are included. In addition, when using learning and teaching type messages it is important to explain why involvement is useful. Our formative assessment messages started "*Your tutor Paul Brett has set a quiz with 4 questions. ...*" On reflection this sounded a bit abrupt and it would have been better to say something like "*Checking how much you have understood is a very useful learning exercise*" Any system which is used to send messages needs to automatically append name of sender, module number, a rationale (where appropriate) and instructions as to how to respond.

Data Protection

Data protection issues are paramount in any text messaging use. It is essential institutions develop systems which enable the use of SMS without any participants actually seeing or being able to see each others' numbers.

Equal opportunities

Equal opportunities issues need to be considered in the use of SMS, as not all students have mobile phones, and not all wish their institution to contact them. Although these students are in a very small minority, any system needs to have a mechanism to allow students to opt out, and for this to be clearly explained to students. Additionally, the opt out mechanism for SMS needs to be one which is distinct from central records. It should also include an opt out mechanism which works through a STOP text message response. E-mail should be used to send the same information to these students. An opt out and in facility is also important for students who might travel abroad and thus would pick up the cost of an international text message.

Technological future

The future of technology though may see even greater merging of text messages and e-mail on phones, or on hand held devices. This of course would negate any future need for distinct text messaging systems.

Reminders for quizzes

The nature of text messaging seems to be that it is an 'instant-response or forget it' technology. Thus when using formative assessment and other SMS message types it is worth reminding students that these are available over a period of time.

Negotiate parameters of use with students

When intending to use SMS for learning and teaching, as with all technology but especially a new one, the use parameters need to be negotiated with learners. This means an explanation of its value, an explanation to ensure full learner awareness of the technology and the learning benefits of engagement.

Further text message types

New types of text messages for interactive learning and teaching could also be considered. This project developed, but did not have enough time to implement, a picture messaging tool to be used with text, which may be useful for learners on work placements. Also a polling tool to engage students in survey activity.

Consideration of other interactive uses of SMS

New models of use of text messages for learning and teaching might also be considered. For example, one in which tutors agree to be texted by students and respond. This of course does have workload implications, but with retention and support issues high on the agenda and instant response type service might be useful.

Message length

When using simple push messages thought needs to be given in any system to the length of messages. Usually, a text message is 160 characters long but often that may not be sufficient to convey the full information, so it is recommended that the system be flexible enough to accommodate messages of longer than the 160 characters. We designed our system to enable messages which could be up to 800 characters in length.

Timing of messages

Related to the point above about negotiating with learners about the use of this technology for learning and teaching, consideration and discussion needs to take place about the optimal timing of such messaging. In addition there is an institutional perspective on the timing of messages. We set our system to close down from 9pm and 8am, as many students sleep with their phones as they use them as alarm clocks.

Borrow pedagogy from what we already know

The use of SMS for learning and teaching is new, and there is not an evolved pedagogy to incorporate in staff development. This project recommends that whilst this still is the case, that we borrow from our understandings of the best practice in a computer based environment, although we expect this change as more studies and types of uses emerge.

Don't proliferate places for holding student information

It is not advisable to encourage students to enter their mobile numbers in a place, just for use in text messaging. Use only one source of centralised data. Use central student records system so as not to encourage data proliferation.

References

- Attewell, J., & Savill-Smith, C. (Eds.). (2005). *Mobile learning anytime everywhere: A book of papers from MLEARN 2004*. London, UK: Learning and Skills Development Agency. Retrieved May 15th, 2008, from http://www.mobilearn.org/download/events/mlearn_2004/MLEARN_%202004_book_of_conference_papers.pdf.
- Biggs, J. B. (2003). *Teaching for quality learning at university*. Buckingham: The Open University Press.
- Black, P., & William D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 80:2, 139-148.
- Bull, J. & McKenna, C. 2004, *Blueprint for Computer-assisted Assessment* RoutledgeFalmer, London.
- Cheung, S. (2004). Using mobile phone messaging as a response medium in classroom experiments. In *Social science research network*. Retrieved May 15th, 2008, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=605863
- Clarke, S., Lindsay, K., McKenna, C. & New, S. (2004) Inquire: A case study evaluating the potential of online MCQ tests in a discursive subject. *ALT-J, Research in Learning Technology*. 12:3, 249-260.

Cook, A. (2001) assessing the use of flexible assessment. *Assessment and Evaluation in Higher Education*. 26:6, 539 –549.

Griffiths, L. & Hmer, A. (2004) U R L8 4 ur exam :)—students' opinions towards receiving timely information via SMS, paper presented at the 11th International Conference of the Association for Learning Technology. University of Exeter, 14–16 September. Retrieved May 15th, 2008, from <http://www.alt.ac.uk/altc2004/timetable/files/133/alt-c-2004-v1-LGAH%20.ppt>

Harley, D., Winn, S., Pemberton, S. and Wilcox, P. (2007) 'Using texting to support students' transition to university', *Innovations in Education and Teaching International*, 44:3, 229 – 241

Horstmanshof, L. (2004). Using SMS as a way of providing connection and community for first year students. In R. Atkinson, C. McBeath, D. Jonas-Dwyer, & R. Phillips (Eds.), *Beyond the comfort zone: Proceedings of the 21st ascilite conference* (pp. 423.427). Retrieved May 15th, 2008, from <http://www.ascilite.org.au/conferences/perth04/procs/horstmanshof.html>

Levy, M., & Kennedy, C. (2005). Learning Italian via mobile SMS. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile Learning: A Handbook for Educators and Trainers*. London: Taylor and Francis.;

Librero, F., Ramos, A J., Ranga A., Triñona I., Jerome and Lambert, David (2007) 'Uses of the Cell Phone for Education in the Philippines and Mongolia', *Distance Education*, 28:2, 231 – 244

Markett, C, Arnedillo Sanchez, I, Weber, S, B. Tangney, B, (2006) Using short message service to encourage interactivity in the classroom, *Computers & Education* 46:3, 280-293.

Martínez-Torres, M. R., Toral, S. L., Barrero, F. and Gallardo, S. (2007) 'Improving learning performance in laboratory instruction by means of SMS messaging', *Innovations in Education and Teaching International*, 44:4, 409 – 422

Morris, L. & Walker, D. (2006) CAA sparks chemical reaction: Integrating CAA into a learning and teaching strategy. *Evaluation of the use of the virtual learning environment in higher education across Scotland*. QAA Scotland.

Naismith, L., (2007) Using text messaging to support administrative communication in higher education. *Active Learning in Higher Education*, 8:2, 155-171

Nichol, D. J. & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education*, 31:2, 199-218.

Stone, A. (2004). Blended learning, mobility and retention: supporting first-year university students with appropriate technology. *Proceedings of MLEARN 2004: Mobile Learning anytime everywhere* (pp. 183-186). London, UK: Learning and Skills Development Agency.

Thornton, P., & Houser, C. (2004). Using Mobile Phones in Education. *Proceedings of the 2nd IEEE Workshop on Wireless and Mobile Technologies in Education* (pp. 3-10). JungLi, Taiwan: IEEE Computer Society.

Traxler, J., & Riordan, B. (2003). Evaluating the effectiveness of retention strategies using SMS, WAP and WWW student support. *Proceedings of 4th Annual Conference*. Galway, Ireland: LTSN Centre for Information and Computer Science, pp. 54-55.

Traxler, J., & Kukulska-Hulme, A. (2005). Evaluating Mobile Learning: Reflections on Current Practice. *Proceedings of mLearn 2005*. Retrieved May 15th, 2008, from <http://www.mlearn.org.za/papers-full.html>.

Appendixes

Appendix A - Evision to PebblePad Data Transfer

There is a script set up on the SITS Server to run each day at 5.00am. There are 7 steps involved to complete the data transfer to the Sweetdb Database on the PebblePad Server. Time taken to run is approximately 1-2 mins.

Step 1.

This stage populates a temporary table on the SITS Server with just the student references matching the selection criteria, i.e. enrolled students for the current academic year. This table is then referenced in the remaining steps to ensure a consistent data set is retrieved throughout the process.

Step 2.

This populates the PEOPLE table on the PebblePad Server. The Student Reference is used for Person_Id and User_Id fields. Address details are used to populate Street1, Street2, Locality, Region, and Postcode.

Step3.

This populates the PEOPLE_NAMES table on the PebblePad Server. The Student Reference is used for the Person_Id field. Three records are created for each student. The 'Given' name record uses 1st Forename, the 'Family' name record uses Surname and the 'Other' name record uses 1st Forename .

Step 4.

This populates the PEOPLE_TELEPHONES table on the PebblePad Server. The Student Reference is used for the Person_Id field. Two records are created for each student. The 'Home' telephone record uses the student's home telephone no. from SITS and the 'Alternative' telephone record uses the student's mobile phone no.

Step 5.

This populates the GROUPS table on the PebblePad Server. These are essentially the Module Definition records. Two types of record are created to describe the modules being studied by students. These records cover the last 3 years of occurrences. The first record uses Module Code as the Group_Id and a Short Description as the Module Name. The second record defines the Module Occurrence, this uses Module Code, Academic Year, Time Slot, and Occurrence to define the Group_Id. Begin_Date, End_Date, Short Description and Long Description fields are also populated.

Step 6.

This populates the GROUP_RELATIONS table on the PebblePad Server. Module Definition and Module Occurrence data for the last three years is extracted. Module Code is used as Parent_Group_Id and Module Code, Academic year, Time Slot and Module Occurrence is used as Child_Group_Id.

Step 7.

This populates the MEMBERSHIPS table on the PebblePad Server. This is essentially the SITS Student Module Registration records, including grades where entered. Student Reference is used as Member_Person_Id and Module Code, Academic Year, Time Slot and Module Occurrence as Group_Id. Data is extracted for the last three years.

Appendix B - SMS Sever set up.

Rationale

The group-messaging server is designed to be a discrete set of functionalities for SMS¹ and MMS² delivery and receipt. It maintains state and identity information along with group designation so all messaging is done through rational identity and not via direct phone numbers. It also contains and maintains a number of “applications” such as quiz, conference and vote management. There is no direct interface, rather, it supplies its functionality to another service such as a virtual or managed learning environment or a portfolio tool. Its primary purpose is educational, being designed with large scale learning institutions in mind.

The development process was iterative and was undertaken alongside the research part of the project. This allowed feedback to influence the shape, functionality and nature of the server to some extent. This process started with an early prototype, which was then redeveloped into a more comprehensive system in the second phase of the project. The comprehensive system comprised of a set of SOAP³ based web services.

Technology

The early prototype was developed on the Apple Macintosh platform under the OSX operating system. Apple’s xCode software was used as the main development environment. It made use of a third party database called “sqlite”⁴.

Of the original technologies adopted for the first phase only sqlite was carried over into the second phase of development. This software has two major advantages for the project of this nature. The first is that it is embeddable within the application. As a result of this a complete production application was deployable. The complexity of having to install and configure a separate database server was avoided. The features, which might have been supplied by such a server, were not required as the group-messaging server needed to maintain information only for its own purposes using only a small number of database features. The second advantage was speed. Being library-based and embedded there was no network call overhead for each database operation; this resulted in major speed improvements for the internal operations of the server.

The majority of the comprehensive system was developed using .NET on the Microsoft Window’s Server platform. This technology was selected because of the ease of developing web services. It also allowed a test client to be developed quite easily which could then be used as a reference prototype giving the developers of other client systems example code to use in their own applications.

Structure

The server comprises of a number of web services each of which is dedicated to particular type of interaction. Each could be seen as a module of the server. The web services are:

- AccountService – allowing user accounts to be created, groups to be created and users to be assigned to groups.
- SendService – allowing a text message to be sent to an individual or a group.
- LogService – for querying the logs generated by all actions
- QuizService – for the creation and operation of sms quizzes.
- ConferenceService – for the creation and operation of sms conferences
- VotingService – for the creation and operation of various types of voting activities

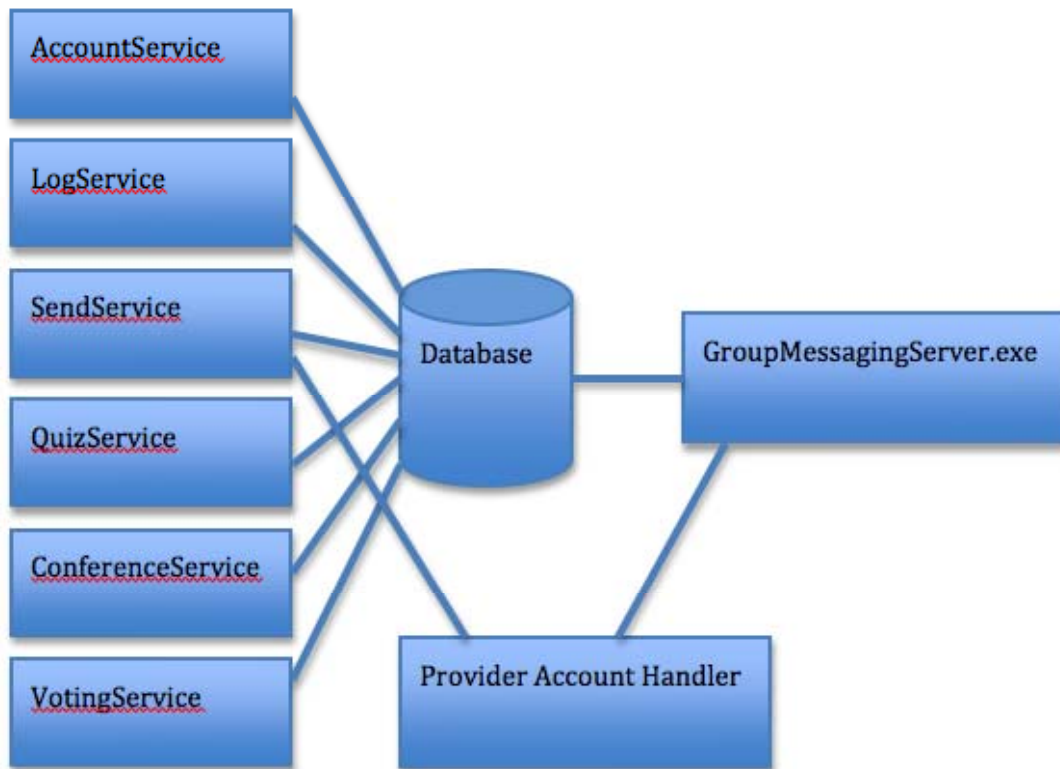
¹ Short Messaging Service

² Multimedia Messaging Service

³ <http://www.w3.org/TR/soap/>

⁴ <http://www.sqlite.org/>

There are also a number of other modules, which handle internal interactions such as database management. One of the most important is the GroupCastServer executable. This is a continuously running application, which interacts with information in the database checking queues and sending messages as required. It also manages the logic of the quiz, conference and voting services by reacting to incoming messages. Finally the server acts as a client to a messaging provider. For this a plugin defining how the server connects with the provider is required called a Provider Account Handler.



Operation

Access to the server is through web services. Before any messages can be sent accounts need to be created using the AccountService. For all but the direct sending web service, groups also need to be created. For instance the quiz, conference and voting services all operate with groups. Each web service has functions for the creation, editing, deletion and operation of that module.

Open-Source

The development project is released under an open-source licence based upon a Common Public License. The source code is available for other institutions to take, recompile and/or modify based upon their own needs. The management of the MELaS project maintains intellectual property, but rights to use, modify and add to the project – through a managed environment - are granted to other developers.

Zips of the latest source can be found at the following addresses

<http://opensource.krispopat.co.uk/melas/GroupMessagingServer.zip>
<http://opensource.krispopat.co.uk/melas/GroupMessagingClient.zip>

Future Development

One of the main areas for future development is in creating new plugins to connect with different messaging providers. This will be necessary for new institutions to connect the server to their own, chosen, service provider. The mechanism to choose different providers is already in place, but

Project Acronym: Melas
Version: 1
Contact: Paul Brett
Date: July, 26th 2008

individual plugins are required to connect to the providers own API⁵. Further pedagogic services could be developed such as a notice board, mind-map and gallery.

⁵ Application Programmer's Interface

Appendix C - User interface and integration of components

The SMS service brings together three components to operate.

Student management system (SITS)
ePortfolio (PebblePad)
MELAS Text management service.

Student Management System

The student management system (SIT) is a central database service operated by the registry department with support for IT Services. This database houses a wide range of information about students including contact information and module registration details. Students can access a web interface to submit changes to some areas of their personal information including phone numbers. With the frequency of change of mobile phone numbers it was therefore highly desirable for a single central point for the storage of phone numbers and so the student management system is the natural choice for the project.

Due to lack of support for XML export of data and concerns over data security, direct access to the student management system was considered inappropriate and so a middleware solution was considered the best option. Building on the work in the LIPID project (<http://www.lipidproject.org>) the Sweet .Net middleware solution was used to support the export and storage of data from the student management system. This data included student ID numbers, names, module registration and mobile phone numbers. This data was exported from the student management system to Sweet.Net on a nightly basis to ensure a reasonable level of accuracy. Sweet .Net could then output this data in an appropriate XML format for easy import in the other systems used in the project.

As the PebblePad ePortfolio system was used in the LIPID project only minor customisation was required to enable it to draw upon the data held in Sweet .Net.

Melas Texting Service

The MELAS texting service is the core element in the system providing the basic functionality. This includes the sending of messages, management of groups and the types of messaging available – simple text, quizzes and conference messaging. The MELAS server acts as the channel for messages from the user interface in PebblePad through to an external SMS message service provider.

ePortfolio

Within the PebblePad system the Gateway facility provides a space for grouping students together for a range of purposes including peer related activity. This was therefore the most appropriate place to include messaging facilities. A grouping model applies to the gateway for subject or module areas and within these groups further user groups can be defined. A new texting role was developed to allow tutors to make the range of texting facilities available to users. Within this management facility a user Interface was built to enable the selection of users to receive text messages. As not all users within the student management system had included their mobile phone numbers there was also a requirement to indicate whether a mobile phone number was available and also to include an option to send an email version of any messages sent. Interfaces were built to access the three key message types within the MELAS: conference messages; quiz questions and standard SMS messages. A history option was also built to allow tutors to view activity within the service such as responses to quizzes and conference facilities. A new preference was also included within PebblePad to allow end users to opt out of the SMS service.

As all grouping information is held on the MELAS server a Web Service is used to synchronize details for each group when they are set up or modified within the PebblePad interface.

Project Acronym: Melas
Version: 1
Contact: Paul Brett
Date: July, 26th 2008

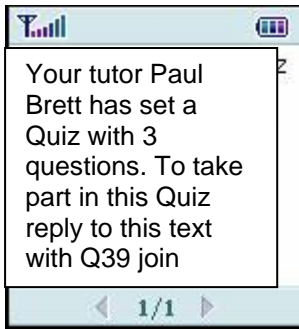
When message are sent from PebblePad group id information is included in the Web Service to enable the MELAS service to forward on to the appropriate group members via the external SMS provider.

Simple messages are stored in the PebblePad database to allow appropriate users to view historical information. For services requiring user responses such as the conference or quizzes, historical information is stored on the MELAS server. This can be access via the user interface in PebblePad by tutors this again uses a Web Service to access the details upon request.

The technology used in the project is .Net 2.0 C for the MELAS services with a SQL Lite database This could be upgraded to MSSQL fairly easily for large scale implementation.

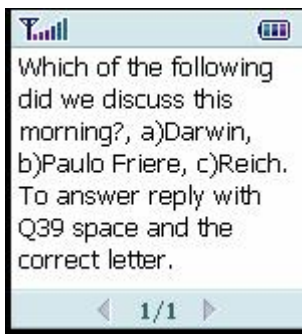
Non Pay Expenditure from Start of Project to 31 July 2008

	Total Spend	
	£	
<u>Staff Costs</u>	<u>56,071.34</u>	56,071.34
Room Hire	<u>380</u>	380.00
Text Messaging	<u>3,055.68</u>	3,055.68
Text Messaging Equipment	<u>2181.28</u>	2,181.28
Hospitality: Miscellaneous Consultancies:	<u>59,508.34</u>	59,508.34
Dissemination & Travel Exps	<u>1523.39</u>	1,523.39
<u>TOTAL EXPENDITURE INCLUDING COMMITMENTS</u>		<u>£123,157.03</u>



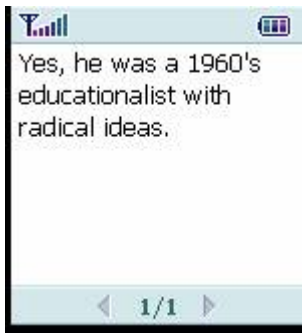
Students text back Q39

Then students receive the question e.g.,



Student texts back Q39 B

Then students receive the feedback eg Yes, he was a 1960's educationalist with radical ideas.



Finally after completing all the questions students get a message with a score.



Appendix F - Generic letter sent to students from staff about the text messaging services.

Dear Students,

This is to inform you of an exciting new addition to your learning which I am going to be using this semester - the use of SMS (text messages to your mobile phone) for learning.

This is a project which the University is evaluating, and so there is no compulsion for you to take part - but I hope you will.

In order to take part, you must have entered your correct mobile phone number into the correct field in e-vision. The details about how to do this are in the document How to put your mobile number into evion.pdf, [click here](#) to access a copy, or [click here](#) to watch a movie about it.

You can choose to stop receiving messages at anytime by replying STOP by text, or by going into PebblePAD - [click here](#) to watch a movie about this.

No messages are sent after 9pm or before 8am.

If a message asks you to reply (e.g., a multiple choice question) then you will pay your normal network charges for this text.

A copy of the text message will go to the University e-mail address of anyone who does not wish to receive texts.

No-one will get, or know, your own mobile phone number.

For full information about the types of learning texts and how they work - [click here](#)

Best wishes

Appendix G - Staff and student questionnaires, copies of the data collection instruments

MELaS Student questionnaire

Do you have a contract (C) or are you a Pay Per Use (P) customer?

Did you "opt-in" to use MELaS?

Did you send any messages to the system?

"The text messages I have received have been useful" What is your opinion of this statement?
What do you think about the number of messages you received?

"The text messages I received have helped my learning" What is your opinion of this statement?

"I like using my mobile phone for learning" What is your opinion of this statement?

If text "quizzes" were used in your module, did you take part?

"I think taking part in a quiz (or many quizzes) helped my learning" What is your opinion of this statement?

If text "conferences" were used in your module, did you take part?

I think taking part in a conference (or many) helped my learning" What is your opinion of this statement?

"I think using text messages in learning is a good idea" What is your opinion of this statement?

How would prefer text messaging to be used to support your learning?

Staff Questionnaire

1. Did you send any text messages?
2. What was/were your initial expectation(s)?
3. Was/were that/those expectation(s) realised?
4. What teaching style(s) do you think this service supports?
5. In what ways do you think SMS supports your teaching?
6. Has this added to, reduced or altered your workload?
7. Do you think this change in workload (or not) would change with your usage?
8. What are your opinions on the interface to SMS (PebblePad)?
9. What reactions did you receive from your students, if any?
10. How would you feel about students being able to text you?
11. What future directions are there for SMS?
12. Would you advise the university to take this up? in whole or parts?