

The Mobile Learning Flipped Classroom

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Abstract: - The use of the smart phone was utilised in a flipped classroom format in a final year Physics course in the Universiti Sains Islam Malaysia (USIM). As final year students, they were exposed to more applications and advanced literature that can be accessed via various resources such as research labs, manuals and journals. By using mobile learning, learners are directed to review content prior to face to face sessions. Learning activities were also instructed for ensuing discussions and deliberations in the classroom. The mobile learning approach was also integrated with the electronic portal to inject a learning landscape for the learners.

Key-Words: mobile learning, pedagogy, flipped classroom, sms, 21st century learner, personalised

1 Introduction

New technology can provide greater support to learners through enhanced communication and collaboration via animated, simulated, and interactive capabilities. Educational interactions that can support the learning process in different ways play a key role in supporting reflection [1]. In a natural progression, the success of the learning process deeply depends on the capability of learners to reflect on their experiences [2]. Elements of learner autonomy still need facilitation as learners have many responsibilities that must be balanced against the demands of learning. These responsibilities also pose barriers against scheduling in learning. Any technique that can be utilized on a frequent and regular basis can assist students in retention of information.

Smart phones and short message service (SMS) are now becoming an inextricable part of a students' life [3]. Initial studies on the use of mobile technology have demonstrated its usefulness in education [4]. These studies also showed that the use of SMS resulted in increased interactions that could lead to more active learning [5].

This augurs well with the flipped classroom concept which describes a reversal of traditional teaching where students gain first exposure to new material outside of class, usually via reading or lecture videos, and then class time is used to do the harder work of assimilating that knowledge through strategies such as discussion, deliberations, group work, problem based learning and other learning strategies. In

the flipped classroom, the roles and expectations of students and teachers change where students take more responsibility for their own learning and study core content either individually or in groups before class and then apply knowledge and skills to a range of activities as designed by the faculty.

2 Mobile Learning

The key to successful channelling in mLearning is not simply about digitising educational systems but the real appeal is to allow for the characteristics of the 21st century learner, viz,

- the learners are constantly on the move
- content now come to the learners
- content has taken a personalised outlook
- content is presented in chunks
- the learning is now ubiquitous
- learners seek to enrich their knowledge, and
- elements of knowledge retention

Several factors were considered before implementing this SMS project for the selected physics nanotechnology course:

- The mobile phone is a communication device that is always with students. Therefore, text messages can be sent regardless of students' geographical location.
- The SMS function can be utilized as an asynchronous form of communication with a student, fostering a sense of connectivity between the lecturer and student and facilitating a supportive learning environment.

- Using the mobile phone would allow a short piece of information to be delivered to students without the constraints of space, time, and Internet connectivity.
 - The mobile phone would form an immediate bridge in communication and activity before a more comprehensive discussion can ensue in the classroom (the flipped concept)
 - The study of physics could benefit from snippets of a lesson (small chunk of content) sent daily as short learning experiences before the students attempt some serious work.
 - The use of mobile technology would complement the electronic portal in terms of learning activity and experiences.
 - SMS can act as a pacing mechanism, helping students with their daily study schedule.
- The aim of this project is to incorporate learning via SMS. Students would receive a small piece of information to facilitate study.

3 Pedagogy

Mobile learning has unique technological attributes which provide positive pedagogical affordances. As Klopfer and Squire [6] summarised, “portability, social interactivity, context, and individuality” (p. 95) are frequently cited affordances of mobile learning. As such, the flipped classroom approach has presented a protocol in the face to face environment via instructions to the learners, viz,

- Receive message (sequential content)
- Read the message
- Copy the message in a notebook
- Store message in mobile device
- Investment of 1-2 minutes/message
- Messages uploaded in portal after one week
- Message in portal linked to further content (pdf, OER, video, url, journal article)
- In class quiz and discussion

The pedagogical approach adopted augurs well with the three constructs characterising the pedagogy of m-learning have emerged: authenticity, collaboration and personalisation. The authenticity feature highlights opportunities for contextualised, participatory, situated learning; the collaboration feature captures the often-reported conversational, connected aspects of m-learning while the personalisation feature has strong implications for ownership, agency and autonomous learning [7].

How learners ultimately experience these distinctive characteristics is strongly influenced by the organisation of spatial and temporal aspects of the m-learning environment, including face-to-face and virtual teaching strategies. In this case, the

smart phone served as an important feature of the flipped classroom as they can be used to:

- capture key content for students to access at their own convenience and to suit their pace of learning, in this example, a journal paper, as well as
- present learning materials in a variety of formats to suit different learner styles and multimodal learning (e.g. text, videos, audio, multimedia)

4 Flipped Classroom

The Physics flipped classroom was aimed to incorporate learning via sms where students would receive a small piece of content prior to a face to face encounter. As an orientation exercise, a message was sent to all students. Students were instructed to review the content and identify salient points for an in-class discussion on the topic. They were also encouraged to have their own discussion via the WhatsApp mechanism and therefore be engaged in an active learning situation even before faculty has an input.

The course selected for this project was the final year applied physics nanotechnology course with the code SFB4073. This course is managed by the author and lends itself well to this project as it contains many definitions and is information rich; constructing a flipped concept based on the content would set a natural learning activity for the students

Fig. 1 shows the screen shot of a sms to the students and Figure 2 show the block of weekly messages for the nanotechnology Physics course.

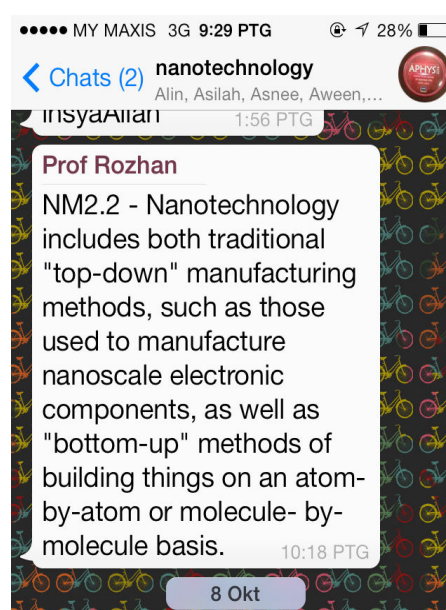


Fig. 1 Screen shot of a sms to the students

Universiti Sains Islam Malaysia - Faculty of Science and Technology
SMS in Nanotechnology SF84073
No. of students: 15
Credit Units: 3

Week	Date	Sms	Message	Notes
1	30/08/14	1	Nanotechnology is the study and use of structures between 1 nanometer (nm) and 100 nanometers in size.	
	01/09/14	2	Matter at the nano scale can behave differently than bulk matter and exhibit unexpected properties.	
	02/09/14	3	Segel - Nanostructured materials are classified as zero dimensional, one dimensional, two dimensional, three dimensional nanostructures.	
	03/09/14	4	Graphene is 200 times stronger than steel, thinner than a sheet of paper, and more conductive than copper.	
2	06/09/14	1	The small size and high surface-area-to-mass ratio of nanosized particles enhance the mechanical, electrical, optical, catalytic, and/or biological activity of a substance.	
	07	2	Nanotechnology includes both traditional "top-down" manufacturing methods, such as those used to manufacture nanoscale electronic components, as well as "bottom-up" methods of building things on an atom-by-atom or molecule-by-molecule basis.	
	08	3	Nanomaterials may be either fused as integral features of larger objects (as electronic components, for instance), or used as free nanoparticles (in composites or pharmaceuticals, for example).	
	09	4	Second type of nanotechnology, productive nanosystems, seeks to produce programmable, molecular-scale systems that make other useful nanostructured materials and devices.	
	10	5	Replicators - the most advanced form of nanotechnology - and the furthest from being realized - are devices that would contain a set of processing and fabrication mechanisms sufficient to replicate themselves.	
3	13/09/14	1	Most current nanomaterials could be organized into four types: Carbon Based Materials, Metal Based Materials, Dendrimers & Composites	
	14	2	Carbon based - most commonly taking the form of a hollow spheres, ellipsoids or tubes. Spherical and ellipsoidal carbon	

Fig. 2 Weekly nanotechnology sms block

An important aspect of this project was to incorporate pacing by constructing the text message according to the sequence of topics in the learning materials. For the sms, were instructed to copy, by hand, each message into their notebook to instill the habit of writing down facts and definitions as well as tips sent to them. It would mean a two-minute investment of each student's time to read and copy the message. Students were also encouraged to store the message in a folder on their mobile phones.

More serious deliberations would be conducted via the forum in the electronic portal, with the event being initiated via SMS. This technique would lead to optimization of the forum and discussion of relevant topics. Students were discouraged from sending one-on-one e-mails to the course manager as this would not benefit other students in the course.

The advent of Internet facilitated online learning anytime and anywhere, albeit subject to the availability of hardware and connectivity. However, Mobile Learning technologies conform to the notion of anytime and anywhere learning as mobile devices remain with the carrier at all times [8]. Hence, Mobile Learning has unleashed content that would otherwise be "stuck" in a textbook or website and would either be an encumbrance or deterrent to student learning.

Fig. 3 shows the block of sms already uploaded in the electronic portal and Fig. 4 show sms with links to the content in the Internet. The link provided will connect the learner to a journal article concerning the subject of nanotechnology.

4 Conclusion

The mobile phone holds the distinction of being the only media or tool that has become part of the student. In a flipped classroom scenario, the

students are not constrained by location such as a house bound computer nor a cyber café but are able to experience an educational transaction prior to a face to face encounter. It is now imperative for faculty to construct pedagogically articulated short messages that will help learners develop an effective study habit. That is now accentuated by the flipped classroom concept.

Fig. 3 sms block in the electronic portal

Fig. 4 sms linking to a journal article

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