

Mobile Apps Integration for Teaching and Learning Are Teachers Ready to Re-blend?

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Abstract: The challenge of experimenting with new mobile technological innovations for teaching and learning is a constant factor for teachers in higher educational institutions. At present universities around the world are finding the application of mobile learning to be boundless, and that mobile phones are now becoming the most commonly used devices amongst students. This paper examines some important features of mobile phone Apps to support teaching and learning in higher educational institutions. Also the rapid and recent developments of mobile Apps for teaching purposes with mobile phones are growing on a daily basis, but are teachers ready to apply these Apps in their daily professional work? Are they prepared to integrate them? In this paper the role of teachers in today's rapidly changing learning environment is discussed and how educational mobile Apps can be blended seamlessly within the currently used settings while serving the emerging mobile learning process and delivery needs of the learning community. This will provide a well balanced learning environment that meets the current digital learners' needs and supports learning experiences that are collaborative, portable, flexible, easily accessible, and can be integrated with the world globally, beyond the traditional classroom.

Introduction

The application of mobile learning technologies within university settings worldwide is still in its infancy, and the development of new models, methods, systems and applications are needed to be put in place for successful integration. Teachers need to re-blend the current learning environment at universities to ensure an efficient and effective mobile learning environment. The rationale behind this paper is that universities, teachers and administrators need to understand and acknowledge the changes in today's learner's attitudes towards learning, and thus design learning content that meets their needs and fits their daily life style.

There is a wide range of mobile devices in the market, which are widely used by the so-called Millennial, generation Y or G2 (born in late 70s to late ninety) (Knezek, G. et al. 2009), and this group forms the majority of today's university students. However, the end-users (students) do not seem to be the problem in adapting these new technologies, whereas the content providers (teachers) seem to be the constraining part today.

Additionally, there are technological constrains which hamper the adaption of mobile Apps for teaching and learning, as mobile devices which are available among students do vary from hi-tech smart devices to the low-tech ordinary mobile device. This makes the implementation of one-size fits all a complex challenge to accomplish by the university. Quinn (2000) stated that a mobile learning solution must work for a wide range of devices, not just for one set of devices. Mobile learning models should be capable of device-independent delivery of learning content and learning management. The major issues are the reusability of content on different devices, plus the usage of different applications such as (Skype, twitter etc.) on different devices. It is time consuming, costly and sometimes it is impossible for lecturers to create content for all different platforms separately.

Therefore there are still difficulties in implementing applications for small compact mobile devices. Some technological issues are due to the limited resources with the device itself, such as screen size, memory, power consumption and storage capacity. As of today, mobile Apps are the best solution to overcome these technological limitations. Apps are being developed at a rapid speed and are intensively used by students. Apps can be easily downloaded and used on a mobile phone device. Today, Apps which could be implemented in teaching and learning environments are widely available for most of the communication and social platforms, such as Facebook, Skype and twitter, and all of these could be downloaded and used on mobile phones.

Hence the main purpose of this paper is to investigate effective and proper integration methods and approaches which can be adapted by teachers so that they can re-blend the learning environment by bringing and

applying these Apps into the learning curriculum and use them effectively to meet students' needs.

Oblinger (2003, 2004), Oblinger et al. (2005) along with McMahon and Pospisil (2005) described today's learners as digitally literate, 'always on' always connected and reachable. They want to stay connected and be reachable, they also want to experiment and have community oriented personalities and characteristics. They are collaborative and multitasking learners who like to study in a group-based environment (McMahon, M. et al 2005). Students stay connected with their peers via SMS, mobile phones, Facebook, Skype, online forms, Twitter, YouTube, MySpace, Blogs etc. They belong to the new digital mobile world. While on the other hand teachers and educators are still reluctant to use these technologies and in particular mobile phones for teaching and learning, and some of them even view these technologies as a distraction for students. They still argue on the use of mobile devices especially mobile phones in class environment! Why teachers don't take this opportunity to use the technology to improve student's collaboration, and interaction thus making the learning environment effective, fun and challenging? This is because most of university teachers are from Generation 1 (G1) which includes the Baby Boomer Generation, born between 1943 to 1961, and few from Generation X born between 1962 to early seventies. They have totally different perceptions to Generation 2 (G2) or the Millennial Generation, which include Generation Y born between 1982 to 1995, and soon to include Generation Z born from 1996 (Knezek, G. et al. 2009).

Therefore teachers from Generation 1 still lack the confidence to use these technologies. Even some very popular platforms such as Facebook, is viewed by them as a distraction for students, and they are very concern about privacy and security issues in relation to its use for educational purpose. They are afraid that they would lose control of what can be shared and not shared amongst students, thus their role as an instructor will eventually disappear (Khaddage, F. et al. 2009). In another article by Knezek D. (2010) the author described teaching without the latest technologies as being similar to practicing the medical profession without technology, and that cannot be performed accurately and efficiently, or/and in certain circumstances cannot even be possible (Knezek, D. 2010).

Therefore teachers should adapt to the current and rapid change with technologies to cater to the millennial digital generation, so that they can match students' behavior and their preferred way of learning. They should be encouraged and trained well to integrate mobile phone Apps and platforms within their teaching methods. As we are going to discuss later, this adaptation can provide benefits for them as educators as well as benefits for students. Mobile Apps for teaching and learning are breakthrough technologies in recent years, and teachers should use them and apply their methods to this effective learning environment. They should acknowledge that mobile phones along with educational and communicational Apps can be an efficient learning tool if integrated properly within the currently used settings at universities, as this could enhance teaching and feedback, thus simplifying the learning process for students, by providing learning via their preferred method, (their Mobile phones along with mobile Apps technologies).

For this reason universities should implement this type of mobile learning environments and technologies for teachers, and encourage them to use it and integrate it into the curriculum. This creates a learning environment that matches and fits today's digital learner's life style and improves their access to learning content, and makes the learning process, creative, collaborative and challenging. It is time for universities and teachers to re-design and re-blend the forms of education according to the changing dynamics of today's learners, thus providing strategic solutions to some existing problems such as the large number of first year dropouts at universities. The application of mobile learning technologies will potentially place universities at the forefront of pedagogical practice and addresses learners needs for flexibility and portability, as mobile learning and its Apps are considered the real authentic, ultimate anywhere, anytime, on demand and with any device, learning experience.

University and Teachers' Role for Proper Mobile Phone Apps Integration

At present mobile technologies are pushing themselves into the education system in most universities, and mobile learning is forming a focal point where mobile technologies and web-based learning intersect to offer anywhere anytime instant on-demand educational information. Stead, G. (2005) stated that the concern is now, how best universities can integrate this fusion technology into their current blend of learning methods. Ooms, et al. (2008) suggested that the use of mobile phones for learning in a classroom setting is also effective as it can promote greater interaction; enhance feedback for both students and teachers, thus allowing teachers to adapt their teaching based on this feedback. Their findings showed also that mobile phones if used for teaching and learning purposes can act as a catalysts for change in learning and teaching approaches, and it can provide benefits for both teachers and students, their findings are summarized in (Figure 1):

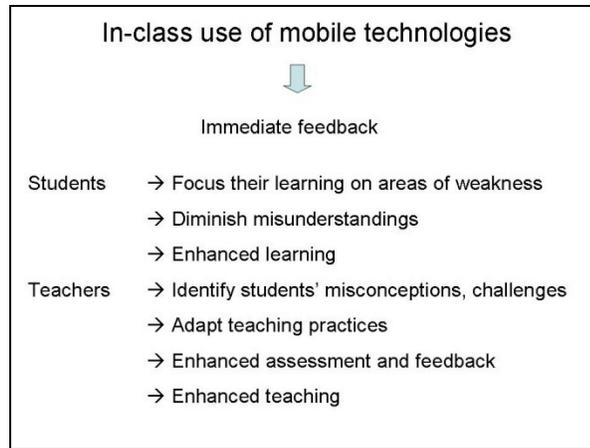


Figure 1: Benefits of using mobile phone for teaching and learning (Ooms et al. 2008)

Even if technologies are existing and students are willing and demanding the use of these mobile learning technologies, well-grounded “frameworks” for integrating these technologies in teaching environments are yet to exist, and teachers still argue about as for what type of settings are mobile learning Apps most effective and efficient? Distance learning, on campus or both?

We believe that mobile learning can be effective, efficient and engaging for both on campus and off campus students. Students from Generation Y are pushing these technologies and they perceive them as an integral part of their life, and they consider them innovative and a step forward to improve access to their learning material. Khaddage, F. et al. (2009) stated that if mobile learning is designed to form a part of a blend, it can offer benefits to classroom learners, online learners and distance learners. Online learners can download resources and connect directly via the Wi-Fi free network using their mobile phone device, or capture images and learning events into their mobile devices and use it later. Distance learner can also benefit, as they can interact, collaborate and communicate with each other or the teachers via the use of Apps, and access resources and course content remotely using their mobile phones. While on the other hand classroom or traditional learners can share learning content and resources via Bluetooth, or via Wi-Fi or/and by publishing the content or information on the App space, and they can also capture images, text, or even record presentations during their class time and share it among each other.

We believe that the process of Apps integration is capable of merging within the online learning and the traditional learning environment without any major changes, thus forming an important part within the overall flexible learning environment at universities. Therefore teachers should implement it and apply it for an efficient, always available and on demand learning environment.

Approaches and Methods

The integration of mobile Apps for teaching and learning via a mobile phone should be based on innovative challenges and methods which can motivate students and encourage them to collaborate and communicate for an effective outcome. As these Apps can form a solid infrastructure for learning content delivery at universities. To integrate this technology, a number of research tasks should be conducted in order to design, develop, apply, test and evaluate these technologies. These tasks can be summarized as follows:

Task 1: Universities and teachers must investigate mobile technologies and devices and their proper applications, and select one device that they see as the most commonly used by students, such as the mobile phone.

Task 2: Develop innovative models and applications based on an extensive investigation of existing learning environments which uses mobile devices and mobile technologies.

Task 3: Develop strategies to efficiently integrate the technologies for teaching and learning using the appropriate methods.

Task 4: Test technologies in real course structure, in real life situation and real learning environment.

Task 5: Develop a set of best practice and technological considerations and design guidelines that can be adapted while designing and applying the technologies.

Task 6: Set up an evaluation framework that can be used to assess different features of the integrated technologies based on functionality, performance, efficiency, accuracy, usability, effectiveness and cost.

Task 7: Set up and develop a policy for teachers and students on appropriate uses of the integrated mobile technologies and applications in and around the campus.

Preliminary investigation which supports our theoretical consideration, approaches and methods are discussed in the following sections. This preliminary analysis shows that the integration of mobile Apps will provide a more natural and flexible way to deliver learning via a mobile device such as mobile phones, and can also make learning fun, creative challenging and collaborative.

There are three crucial aspects which could be considered while using and adapting these mobile phone Apps, to create a unique learning environment which is informal, flexible, student's led and controlled, and they are as follow (Table 1):

- Teachers: How confident are **teachers** with the technology?
- The University: How flexible is the **university** itself in supporting this learning environment?
- Apps and technologies: How can content be provided with **mobile Apps technologies**?

Teachers Preparation	The University	Mobile Apps Technologies
Training, and encouraging flexible informal learning	Learning Content accessibility	Setting of a Wireless protocol via Wi-Fi free network
Information acquisition by today's digital student	Student data and information sharing and secure storage	Learning material delivery via Mobile Apps
Teachers role, encourage, facilitate and learn with the students (informal)	Policies for proper use of technologies	Digital Audio/video, (YouTube) and Multimedia
Sharing, collaboration, coordination	Copy rights, security and privacy issues	Compression and indexing of data for fast retrieval
Inspire creativity, hands on learning, students' led and controlled	Teachers preparation, (inviting new ideas, new technologies)	The idea of Cloud-Computing for mobile Apps integration

Table 1: Aspects for Apps Design and Integration

The implementation of mobile Apps and technologies as a whole, can offer many benefits to the university learning environment:

- Fast, easy, convenient, efficient and accurate mobile access to learning content.
- As a supplement to the traditional and online learning presentations.
- As a means of offering teachers and students a sharing collaborative learning environment.
- As a means of taking topic notes anywhere they like, without being attached to a wired computer.
- As a method of proper mobile integration within the current learning environment.
- Portability, flexibility and availability of the learning content, when this content is saved on the mobile device, and can be transferred, shared and copied.

Teachers can classify Mobile Apps to three different but related tools, as illustrated in (Figure 2).

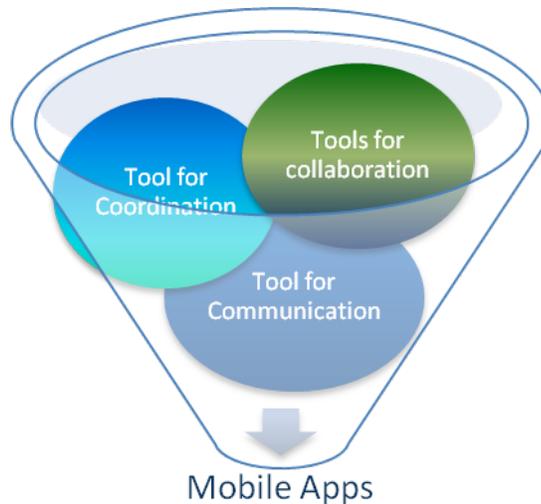


Figure 2: Mobile Apps and Tools

- **Apps as tools for Collaboration** (such as Google Apps) can be used for sharing documents and files
- **Apps as tools for Coordination** (such as Twitter) and can be used to inform students about assignments due date class organization etc.
- **Apps as tools for Communication** (such as Skype, Facebook) and can be used for synchronous and asynchronous communication, discussion and sharing among students

Standardized methods for tests of usefulness and adaptability in the particular learning environment should also be conducted at the start of the integration process and again at the completion of the integration process. This should be carried out to determine students' and teachers' satisfaction with their access to learning content via their mobile phone and through the use of mobile Apps. Also learning outcomes among students are to be assessed to determine increased collaboration level and improved knowledge acquisition process.

Various test criteria for the technology itself should also be defined by the development of evaluation criteria that is used to cover the evaluation of the overall mobile integration process. Quantitative and qualitative data should be collected and analyzed to give an overall evaluation on the design, implementation and development of the mobile technologies and applications. This will be available in future publications as our research on App integration and teachers' education is ongoing and continuous, and the outcome is likely to answer few of the many questions such as:

- Whether the resulting mobile Apps integration for teaching and learning has fulfilled the specified requirements for teachers as well as for students?
- How well does this integration solve access problems of learning content via mobile devices?
- What pros and cons does this mobile learning technologies and application have?
- What type of security and privacy issues are to be implemented and put in place?

Mobile phone Apps integration is to take into consideration all aspects of learning via mobile devices and how best to successfully fit these into the university, and how we can encourage teachers to use and adapt them. There have been a few successful stories on Apps integration for teaching and learning, but the majority of them are for primary and elementary schools, and not done within a university environment. One good example of a successful integration is at a Central Elementary School in Escondido, California, a fourth-grade classroom using iPod touch has seen very good results, every student's reading score went up, and overall progress rates were two to three times those of other classrooms in the district that did not use Apps for this purpose (Apple, 2010).

According to a recent study by one of the world's leading market research groups TNS (2010), their findings show that users are more likely to use their mobile phone to access social networking sites such as facebook, and on average users spend 1.4 times as many hours using social networking sites than reading and other activities. They also tracked the online activities of about 50,000 users between the age of 16 and 60 years of age in

46 countries, they cited that there is an “increased need for instant gratification” they also focused on the popularity of social networking platforms on mobile devices and found that more users, both in the U.S. as well as in other countries are spending more time accessing social media and other Apps on their mobile devices than their normal computers (TNS, 2010).

Therefore the time has come for universities to re-blend and re-design as this re-blending is capable of producing an effective mobile learning environment and efficient architecture which can provide a layered prototype covering all major levels of infrastructure within a university environment.

The results from the preliminary investigation and analysis which is shown in the next section, supports our hypothesis that the integration of mobile phone Apps brings benefits to teaching and learning at universities. As we believe that the use of mobile technology and its application and strategies is capable of making the learning process deployable, flexible and applicable to today’s students.

Preliminary Investigation and Analysis

In this section we will briefly describe a preliminary investigation and analysis we performed in order to support and validate the findings from our theoretical considerations. The required elements of methodology, data collection and data analysis are beyond the scope of this paper, and should be available thoroughly in our future publication.

This preliminary analysis is based on an investigation being conducted in Japan which began in August 2010. This investigation is current and ongoing, and focuses on the use of Facebook and the Facebook mobile App by students studying EFL (English as a Foreign Language) in Japanese universities. Facebook is used as the tool for communication and information sharing amongst students and teachers alike, but it is worth mentioning that Facebook has fewer than 2 million users in Japan, and currently falls well behind Mixi, a Japanese social networking platform with more than 25 million users (Tabuchi, 2011). However, Japanese foreign language students with experiences abroad and/or with foreign friends in Japan are more likely to have Facebook accounts than average Japanese, so this group of students was selected for our study. Our findings indicated that although computer use is still dominant, a large number of university students use their mobile phones to access content, communicate and share information on Facebook.

A convenience sample (N=245) was taken of foreign language majors (mostly English majors) in 4 Japanese universities in Kyoto, Japan. Approximately 1/4 of these students (27.1%) had Facebook accounts that they use to communicate and collaborate with friends. Students were asked how they connected to Facebook - by computer, by mobile phone or by both. One half (50.7%) of respondents reported connecting to Facebook only by computer, a lesser amount (41.2%) reported connecting by both mobile phone and computer, and 8.1% of students reported connecting only by mobile phone. Almost three quarters of students (72.3%) stated that they were more likely to connect to Facebook by computer. The most common reason given for why a computer was more often used to connect to Facebook was that text and photos are easier to see (31% of all comments) on a computer screen. In addition, some students mentioned that logging in and navigating the Facebook site was also difficult to do on many current models of Japanese mobile phones. A point mentioned that is especially important when considering educational applications of mobile phone technology, was that inputting text is cumbersome from a mobile phone compared to a computer. However, with the advancement of technological innovations, today’s mobile phones, “smart phones”, are becoming fusion technologies, and come equipped with many functionalities and features, thus most of the limitations in navigation, text input and multimedia display are already being solved by these hi-tech devices such as the iPhone, the blackberry, Samsung Galaxy and so many others.

Those students that reported using a mobile phone more often to connect to Facebook were enthusiastic about the convenience of mobile phone use. The reason most often stated for why a mobile phone was used more than a computer was the appeal of the anytime anywhere convenience of mobile phone use (25% of all comments). This finding may be influenced by the fact that Japan has a well developed public transportation system and students often use busses and trains to go to school. Lead by the iPhone, smart phones are just beginning to become more popular in the Japanese market, and it can be assumed from the results of this investigation that the convenience of smart phones and their increased functionality will lead to increased use of mobile Apps such as the Facebook mobile App in 2011 and beyond.

To be able to conduct a cross-country comparison in the future, we took a convenience sample of Australian students to analyse their opinion about mobile educational Apps. As a starting point we conducted a small scale informal testing at Deakin University Australia during September 2010 on a small group (N=24) of first year students studying programming. When asked if they do prefer the course material to be provided to them via a Mobile phone App, an astonishing 85% of them were very positive and excited about the idea, even some of them about 25% suggested that they are willing to experiment with App development, and they asked if this process could be considered as an assessment for them. On the other hand when the idea was discussed informally with some of the teachers and administrators at the university, the majority of them were not so keen about the idea.

We are now in the process of obtaining Ethical Clearance according to the Australian regulations, so that we will be able to conduct formal testing where quantitative and qualitative data will be collected and analysed to give an overall evaluation on mobile phone Apps integration.

We are also in the process of collecting more data on student's acceptance of mobile Apps integration for education from German universities, but due to time constraints for this paper we were unable to finalise and publish the results. Our aim is to collect more accurate statistics from some major universities in Japan, Germany and Australia, where we have access to students. Therefore the required elements of methodology, data collection and data analysis to support our findings shall be available in our future publications.

For now, the general sense gained from this preliminary investigation and analysis is that in Japan as well as in Australia the convenience of being able to connect to the internet and access Apps using a mobile phone is very appealing to students, but not so much yet to teachers, and since mobile computing technology, currently being led by hi-tech mobile devices such as the iPhone, Samsung Galaxy, Android and iOS platforms and enormous amount of Apps, the movement towards the use of mobile devices in education is on the rise. Not only is this trend likely in educational settings but also for different organisations, as there are Apps for business, Apps for health, and Apps for almost anything (Jahns, Mikalajunaite, 2010). They are being developed on a daily basis and ready to be used, this rapid development can simplify the process of Apps integration for teaching and learning for non-technical users from all different educational backgrounds, as they would only be required to integrate a particular App and use it without worrying about the technological aspect behind its development and implementation.

Conclusion

The main purpose of this research paper is to describe the steps necessary to construct an effective educational mobile learning environment and to discuss the process of a meaningful Apps integration which can prompt collaboration and coordination among students and teachers. This paper is designed for teachers at universities to help them develop understanding of mobile Apps and educational mobile multimedia and social networking, and to help them build knowledge and confidence for proper integration which can promote an effective and flexible learning environment.

The process of Apps integration can form a bridge between two disciplines: Educational Technology and Computer Science. Collecting and combining knowledge from these two disciplines can be very useful and meaningful during the integration process. Also the outcomes can be relevant not only to universities but also to other education sectors, such as VET (Vocational Education and Training) secondary, and elementary schools. In this respect this paper is broad as we have tried to raise many crucial issues, challenges and ideas, as we strongly believe that mobile Apps integration is considered effective, efficient and multidisciplinary for education globally.

References

Apple Educational Apps (Educational Applications)

<http://www.apple.com/education/apps/> [Last accessed 9 January 2010]

Jahns, R. Mikalajunaite E. (2010) "the smart-phone Application Market" Research2guidance the mobile research specialists August 2010. Online article. Available online from: <http://www.research2guidance.com/> [Last accessed October 2010]

Khaddage, F., Lanham, E., and Zhou, W. (2009) "A Mobile Learning Model for Universities, -Re-blending the Current Learning Environment, published in the special edition of "The International Journal of Interactive Mobile Technologies. ISSN: 1865-7923

Khaddage, F., Lanham, E. and Zhou, W. (2009) "Mobile Phones as a Learning Device, Is It Time to Stop the Ban?" *IADIS International Conference of Mobile Learning 2009* Proceedings p347 Barcelona, Spain, ISBN: 978-972-8924-77-5

Knezek, G., Christenson, R., Tyler-Wood, T. (2009) "Addressing the Need of Digital Age Learners" [Video] part 1, 2 and 3 (2009). Available on YouTube, from <http://www.youtube.com/watch?v=3pCUAh2uD7w> [Accessed 12 November, 2010]

Knezek, D. (2010) "8 Ways Technology Is Improving Education" online article available on Mashable/Tech from <http://mashable.com/2010/11/22/technology-in-education/#> [Accessed on 11 December 2010]

McMahon, M., & Pospisil, R. (2005). Laptops for a digital lifestyle: Millennial Students and wireless mobile technologies. *Proceedings of ASCILITE 2005*.

Available online from <http://www.ascilite.org.au/conferences/brisbane05/proceedings.shtml>

[Last accessed 6 May 2010]

Oblinger, D. (2003 July/August). Boomers, Gen-Xers, and Millennials: Understanding the new students, *EDUCAUSE Review*, 38(4), 38-47.

Oblinger, D. G. (2004). The Next Generation of Educational Engagement. *Journal of Interactive Media in Education*, (8). Available online from <http://www-jime.open.ac.uk/2004/8/oblinger-2004-8-disc-paper.html>

[Last accessed 12 October 2010]

Oblinger, D. G., & Oblinger, J. L. (2005). Educating the net generation. *EDUCAUSE*. Available online from <http://www.educause.edu/educatingthenetgen/>

[Last accessed 20 Feb 2010]

Ooms A., Linsey, Webb and Panayiotidis (2008) "The in-classroom use of mobile technologies to support diagnostic and formative assessment and feedback. Paper presented at the 7th London International Scholarship of Teaching and Learning Conference, London, U.K. 2008 Kingston University

Quinn, C. (2000). Mobile Learning: Mobiles, Wireless, In-Your-Pocket Learning. LiNEZine. Available online from <http://www.linezine.com/2.1/features/cqmmwiyp.htm>

[Last accessed 15 June 2010]

Stead, G. (2005): Moving Mobile into the Mainstream, M-learn 2005: 4th World conference on m-Learning.

Available online from <http://www.mlearn.org.za/CD/papers/Stead.pdf>

[Last accessed 5 February 2010]

Tabuchi, H. (2011, January 9). Facebook Wins Relatively Few Friends in Japan

New York Times http://www.nytimes.com/2011/01/10/technology/10facebook.html?_r=1

[Accessed 2 February, 2011]

TNS Digital Life (2010), "Social Media Now More Popular Than E-mail on Mobile Devices"

Online article available from <http://discoverdigitallife.com/> [Accessed 9 January, 2011]