

Connecting Classroom and Museum Learning with Mobile Devices.

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Many schools in industrialised and developing countries are now using mobile devices. This has the potential to connect learning that occurs in classrooms and museums. This paper focuses on the use of iPads by a year 6 class (12 years old) in Sydney Australia, which were used both in the classroom and on a museum excursion. The study uses a qualitative methodology. Results of the study show the iPads were able to support and link learning in both locations although there were logistical considerations which limited their potential.

KEYWORDS: museums, iPads, mobile learning, formal learning, informal learning, primary schools.

Introduction

Many schools in industrialised and developing countries are now moving towards a one-to-one mobile environment.¹ Typically the choice of mobile technology is the tablet. One of the main benefits cited of tablet use is that it allows learning to take place anywhere and anytime.² The ability for tablets to be easily transported and used in settings both inside and outside of the school means they can enhance and connect learning that takes place in the classroom and in the museum setting. This has the potential to make learning more meaningful and purposeful for students.

Museum settings, (which include zoos, educational visitor centers, art galleries and museums) are also beginning to embrace the use of mobile technologies to support the visitor experience. The NMC Horizon Report Museum Edition predicts an increased use in the use of Bring your own Device (BYOD) to support learning in museum settings.³ This strategy is because many people now take their mobile devices with them. This BYOD policy fits in well with schools' growing use of mobile devices.

Learning in museums is referred to as informal learning which tends to be free choice, exploratory, open-ended and social.⁴ Formal learning in schools, on the other hand, tends to be more highly structured.⁵ It is also more outcomes-based and assessment driven.

The focus of the research was to understand how iPads were being used both in a classroom and a museum setting and how they were used to link learning between the two locations, both pre and post-museum experiences. To this end, a research project was undertaken over a term looking at year six class (around 12 years of age) in Sydney Australia, focusing on classroom lessons and a museum visit to come to such an understanding.

The History of the use Mobile Devices in Schools and Museums

The research that informs this article draws upon a number of different focus areas including mobile use in schools, mobile use in museums and mobile use across museums and schools.

The introduction of iPods into schools saw a small handheld tool that could be readily adapted to supporting learning in primary schools. The uses of this device include promoted comprehension and writing skills.⁶ More recently, the iPad has become the mobile device of choice in many schools in developed countries

Museums have also used a range of resources via mobile devices to support education since before the turn of the century. In a study reported on in 2003, Personal Digital Assistants were used in a lighthouse museum in Glasgow.⁷ Mobile palmtops have also been used to support educational games in museums.⁸ More recent examples include facilitating multimedia tours.⁹ They are also used to supplement information via the use of QR codes.¹⁰ Whilst there is a wide variety of literature on mobile device use in museums, there is a limited amount focusing on school students' use of such devices.

A small number of research projects report where handheld devices have been used to connect students across school and museum context. One example is the Zydeco project which creates new, multimodal ways of integrating learning and inquiry across the school and museum.¹¹ Another example is Myartspace, which is "a service on mobile phones for inquiry-led learning that allows students to gather information during a school field trip which is automatically sent to a website where they can view, share and present it, back in the classroom or at home" (p. 1).¹² A further research project looking at the links between museums and schools using technology is called MuseumScouts.¹³ These studies have been set up specifically for the life of the research rather than focusing on how learning might be facilitated using existing resources provided by the school and museum.

Whilst the studies above focus on both school and museum learning there is no clear focus on learning prior to the excursion, on the excursion and after the excursion which is taken up in this article.

Methodology

The study was qualitative and employed case study methodology.¹⁴ Drawing on this methodology, the study was able to establish a rich detailed understanding of the use of iPads to support and link learning across the classroom and museum.

School Site and Participants

The research was conducted in a private boy's primary school in suburban Sydney, Australia. There were 25 year 6 boys in the one class and their classroom teacher. The students were completing a unit of work on national identity throughout term three. They undertook a three day excursion to Canberra (the capital city of Australia) as part of the unit of work. The class visited many institutions while in Canberra including the visit to National Museum of Australia, which is a focus of this study.

Data Collection

The data collected included questionnaires, direct observations, informal interviews and the collection of artifacts from the iPads. The students completed two questionnaires.

There were four classroom observations, two prior to the excursion and two after which were video recorded I engaged with the students on the tasks they were completing with a group of students during several of the classroom observations. The classroom teacher participated in one interview prior to the excursion. He also participated in one interview after the excursion.

The classroom observations and interviews typically took around one hour. The excursion visit took 90 minutes and was part of a series of visits held over the day. I accompanied the students and teacher on the excursion and recorded aspects of it using a video recorder.

Data analysis

The data were coded for each type.¹⁵ The next step was to compare and contrast all the items that had been assigned. From this, the different data sources were compared and contrasted. Through this process a set of categories emerged. These preliminary categories were then condensed into a more structured and useful set of categories as the analysis proceeded, in order to, “clarify what the categories ... mean, as well as identify sub-categories and relations among categories.”¹⁶

Results and Discussion

The results are set out chronologically and focus on learning leading up to the museum excursion, the visit to the museum, and then work and discussion that occurred after the museum visit.

Pre-Excursion Classroom Work

Early in the term the students were asked to fill in a Plus Minus Interesting (PMI) chart about how they perceived using the iPad might support their learning at the museum. The column to the right lists the number of responses:

POSITIVE	NEGATIVE	INTERESTING
QR codes x4 access to information x5 wifi iPad games for learning note taking portable/compact memorable photos video/voice motivation using popplets finding out about the past X2 faster to type than write	carrying iPads around x4 distracting x4 may break games wifi may be down	wifi x4 QR codes x2 extra information distraction computer do everything able to take notes learning about the past

Table 1: Pre- excursion PMI

The results indicate that there was an expectation regarding what resources such as QR codes and wifi would be available which would provide access to information. These resources were not available at the time of the visit. These are areas where museum educators might provide resources to schools visiting as there is a growing expectation they will be available which in turn dictates the type of learning that is envisaged by teachers and thus, supported in the classroom before the museum visit. Information regarding what type of resources that support iPad use such as apps and wifi could be displayed on the museum web sites. Many museums are not providing this type of access.

Orientation to the museum

It is important that students are prepared for the museum visit which includes: “the students’ prior knowledge ...; specific classroom preparation for cognitive learning at the venue ... and orientation to the setting to be visited”.¹⁷

The factors above were observed in one lesson where the students were asked by the teacher to use their iPads to locate resources, ideas etc that to investigate at the museum. The students were asked to begin a mind map. The purpose of this was pedagogical and provided a starting point for investigations.

The students visited the museum website and began to focus on particular aspects of the museum that they could visit whilst on the excursion to help them answer the research question. For part of the lesson I focused on a group of four boys as they looked at various aspects of the museum web site. They had a mixture of the museum internet sites and mind maps open.

One of the strengths of tablet devices in facilitating this prior knowledge was that it allowed the students to collaborate with each other as a group of four and build on each other’s ideas which would be difficult with desktop computers.

The museum excursion

The students were encouraged to use the various pieces of software such as imovie, mind maps, notes, the camera app as well as the audio recorder app to collect information that would be used to complete a project once they were back at school.

They took a number of photos as they walked through the various exhibits. One student was observed discussing one artifact with the classroom teacher who encouraged him to take a photo of the artifact to possibly use back at school. The students made use of the video app to capture footage of some video exhibits observed of some dancers.

The teacher encouraged the students to be reflective through the choice of these multimodal resources.¹⁸ Choice for museum participants has also been identified as an important factor.¹⁹ The decision when and what resources to use on the iPad are important considerations in considering student choice at museums.

The students also took notes and some even started to organise their thoughts into the presentation as shown by a screen shot of one student’s work:

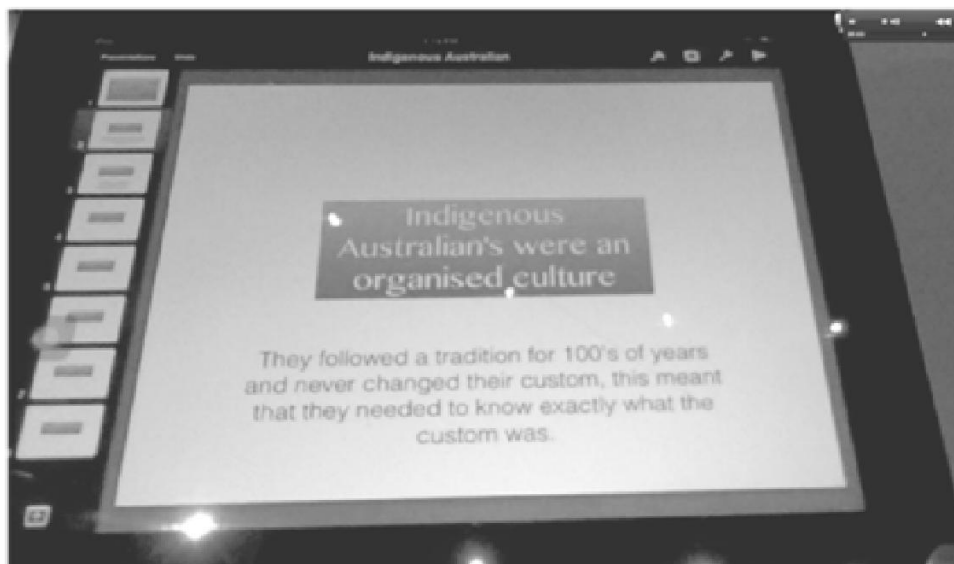


Figure 1: Student's writing at museum

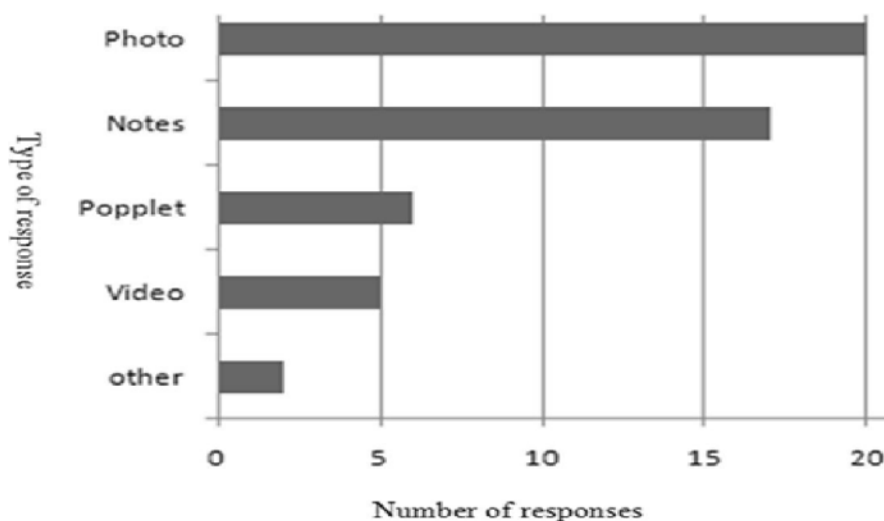
The teacher got the students into the class group for a short discussion during the excursion and asked them what they were capturing and how they were using the iPads. One student replied: *I used my iPad to take photos so I can always go back and always remember it.* Another student stated he used a mind map to record how Aborigines used the environment. Some of the students stated they were using the video app.

The teacher stated that during one part of the museum experience the students watched a short movie and wanted to video capture it but were not allowed. The students stated they would have liked to have captured images and video but also were not allowed to in some areas of the museum.

One reason this was not permitted to do this was out of respect to the Aboriginal culture. The teacher explained that the limited the students' ability to be able to record information with which they could later reflect on. Where videos and photos were not allowed some students used the Note or the Mind Map app which did provide for information the students could follow up on later.

Both teachers and students could be alerted to where iPads might be used in the museum via information on the museum web site which would allow them to prepare for the museum visit and the entire learning experience.

The students [N=22] were asked what they used the iPad for whilst they were on the excursion. Graph one set out the responses:



Graph 1: Uses of iPad on excursion

This response reflects the observations at the museum with photos being a clear favourite with the students. The teacher expected the students to collect material in order to complete their project back at school. Whilst this was the case, the students were not expected to collect a specific type of information such as video or take notes. The students were given the freedom as to what, and how much information was gathered.

Whilst the students were walking through the exhibits the iPads did not appear to inhibit their social interactions, which is an important aspect of museum learning.²⁰ The iPads can also

enhance cognitive processes.²¹ The students were observed in one group using a hands-on artifact and discussing what it was and how it was used. At this point some students were talking and other students were observed working on their iPads

Post-excursion work

Once the students returned from the excursion they worked on creating a document using the materials they had gathered while on the excursion as illustrated in figure 3:

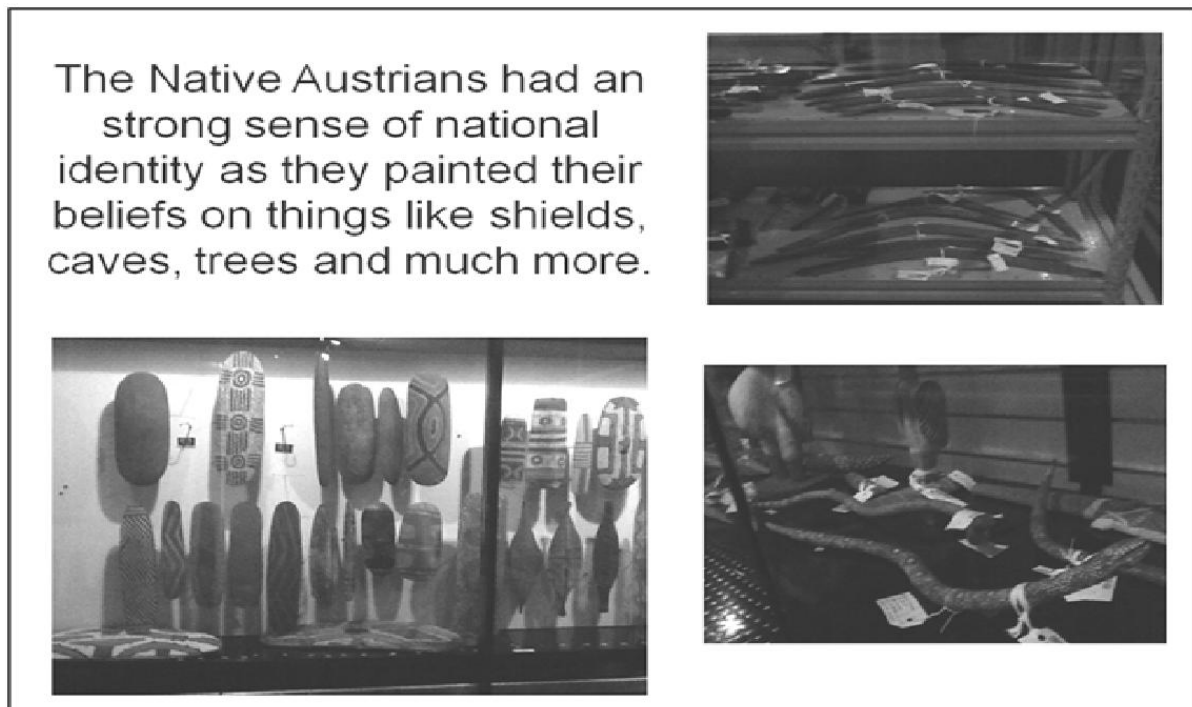
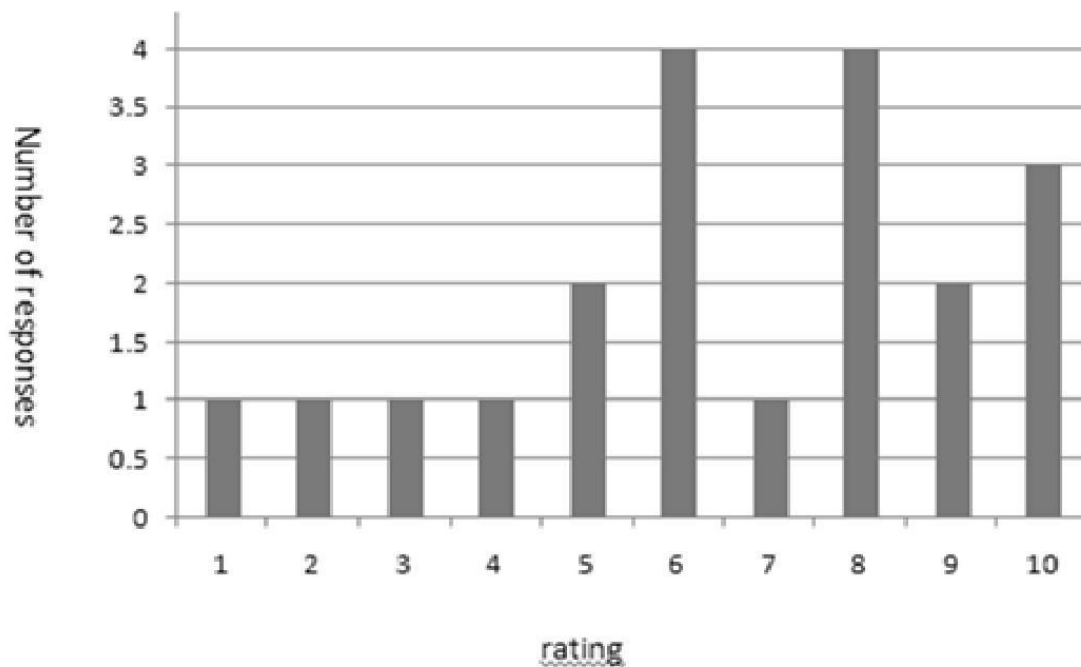


Figure 2: Screenshot of keynote example page

The screen shot above is an example of the one of the pages produced by a student which is typical of the structure of the text and the types of resources students used to produce the slideshow.

The students were asked to rate how useful the iPad was overall to support their learning with the results shown below



Graph 2: Rating of iPad at the National Museum

From the above graph, approximately 64% felt they were useful while 36% felt the iPads were less that useful.

Students who recorded a high satisfaction number felt it was useful in capturing images and for taking notes. One student wrote: *“I think that the iPad was useful because it could take photos. I was able to copy the photo directly into my presentation, instead of taking a photo in a camera, and having to do the troublesome procedure of transferring photos onto a computer.”*

The iPad provides both the means of capturing data and then the means to then manipulate, construct and re-represent the information. This ‘convergence of activity’ allow pupils to produce work in a way that is easier for them to manage and understand. Given the ability for mobile devices to connect learning across space and time, it is suggested that: “Teachers need to rethink boundaries, pedagogy, and curriculum” (p. 183).²² Museum educators can consider these aspects when setting up *exhibitions* and presentations.

Students who recorded a low number commented that the iPad was a distraction, in part because of the size. Another reason for the distraction was that the iPads had some games on them. The ability for digital devices to distract students in college has been reported in the literature.²³ The teacher also identified that the iPads had the ability to distract students in the classroom. As shown in table one, students were also concerned in regards to the distracting nature of the iPads. The students did not appear to be distracted by the iPads at the museum and used them constructively to capture information. This may have been different if wifi was available.

I asked the students what features they might like to see facilitated by iPads in the final class session. They suggested that one way that museum educators can support school visits is to provide apps that link to various exhibits which enhance the information provided by the exhibit. Maps of the venue could also be provided to help orientate students at the museum. Timetables

of events with live reminders could also be provided via the iPads. These apps would potentially enhance the learner experience rather than detract from it.

Conclusions

Findings of the research indicate that the iPad was able to be used to connect student learning across the school and museum setting. The role of teacher is paramount here to ensure this occurs. Through its use, students were able to connect to content as well as be orientated to the museum and the various resources before they visited.

There was general agreement from students and the teacher that the iPad did support learning at the museum. The students were able to use a variety of apps to record ideas and information on the excursion. This provided elements of multimodal learning and also provided students with extra choices as to how they facilitated their own learning. The use of the iPads did at some points facilitate social interactions as students talked about their work and the museum exhibits. There were limited resources set up by the museum such as lack of wifi to support student's use of the iPads.

Given the nature of learning at museums, the impact that iPads have on experiential hands-on learning means they are not suited to all museums such as science museums. Also, limitations on how the iPad can be used, for example taking photos in culturally sensitive settings, means that iPads have limitations in some museums.

Whilst there are such limitations, there is scope for both museums and schools to collaborate together so that suitable resources can be developed that support learning across the different settings. This collaboration can be facilitated by training, both for teachers and museum educators as to how mobile devices can support such learning.

Notes

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Dr Damian Maher is a lecturer in the school of Education at the University of Technology Sydney (UTS), Australia. His research interests lie in how technologies can support learning in schools and in formal institutions such as museums. In particular, he is interested in how the use of technologies can be used to link learning across the different contexts.

