Comparative Analysis of E-learning: Australian Context

Danilo Valeros Bernardo*
Db2Powerhouse Social Enterprise, Sydney, 2000, AUSTRALIA

Abstract

The implementation of learning technologies in some subjects in some secondary schools across Australia is still in its early stage. Not surprisingly, the reason is that most, if not all, of the subjects currently being taught do not require the aid of learning technologies. Typical lessons, however, delivered in the class – such as in social sciences, arts and languages – are performed by a teacher with the aid of learning technologies. Often, these technologies are suitable for lessons that do not require extensive project development and presentations, such as subjects in Industrial Work (e.g., wood and metal work). In this paper, the author looks at a different approach in achieving learning outcomes focusing on these subjects then introduces learning tools that encourage students to work in teams to assist them in developing and completing their projects. Two learning technologies are developed and tailored, and evaluated for particular classes. The results indicate that these technologies have assisted in achieving elaboration, collaboration, and the intellectual and social development of groups of students working on skill- and time-extensive subjects. The comparative analysis performed in this work is considered the first in recent years.

Keywords: WebQuests; ICT; Internet; Technologies;

1. Introduction

Adopting learning technologies in various schools remains to be a challenge: not necessarily in the context of availability of resources, but rather in the very nature of the subjects that are being taught. These subjects

* Corresponding author. Tel.: +612-408-623-654;
E-mail address: bernardan@gmail.com.

© 2012 Published by Elsevier B.V. Open access under CC BY-NC-ND license.
Selection and peer review under responsibility of Information Engineering Research Institute
are practice-based, requiring skills and work in workshops and labs that leave no room for ICT. In this paper, the results of the study are presented after investigating and implementing two learning technologies in workshops. This is to determine their feasibility in achieving good learning outcomes. The selection of two distinct resources – WebQuests and video streams - in teaching and learning may appear opportunistic, given the fact that both have been particularly useful in teaching wood crafting in one of the woodwork workshops at a New South Wales (NSW) public school. Nevertheless, it is a particularly valuable opportunity, given that we specifically designed and created WebQuests, which is published on the Internet, and introduced video streams in the class to capture the development, through to completion, of the students’ projects. The WebQuests is available to students in schools across Australia and across the globe, including the Philippines, Singapore, the United Kingdom, and the United States of America.

Instead of being merely general purpose tools, the video streams for year 12 students are for specific educational purposes. This resource does not focus on operational functions (how to create and capture videos) but focuses rather on students’ learning capabilities, and on how to evaluate their work using this particular resource in class while they are developing their major projects for the Higher School Certificate (HSC). Both learning technologies (WebQuests and video streams) have since proven to be good resources for our high school students, as an adjunct support to our daily interaction with them in class. These resources are designed and developed to help achieve the syllabus outcome set down by the NSW Department of Education for the teaching of Arts, Sciences and Technology curricula throughout the state.

The contribution of this work provides an interesting avenue for other teachers to consider and eventually adopt learning technologies in various workshops and laboratories in high schools across the state of NSW.

2. Description of Tools

2.1 WEBQUESTS as a Resource

Advances in the use of ICT in the classroom have rapidly progressed in recent years. The areas of greatest expansion are those that use the Internet through hypermedia and hypertexts.

WebQuests is one such area. It has been designed to provide a “scaffolding” for Internet-based research projects that require thinking, according to McInerney & McInerney (2002). This resource, moreover, encourages a higher level of cognitive processing - i.e., analysis, synthesis and evaluation - which has been embraced by most schools in Western countries, including Australia. It was introduced by Bernie Dodge (McInerney & McInerney, 2002), and a range of WebQuests has since been designed as educational/learning resources. The WebQuests developed targets students from year 7 to year 9, and a link to this resource (scaffolding) can be found on the website Db2P (2012).

Research in cognitive psychology, according to March (2004), indicates that in order for novices to perform and improve at more expert levels, they need to analyse the work of experts and learn from the same process. This is an approach called scaffolding (Bereiter & Scardamalia, 1984).

Scaffolding is at the centre of the WebQuests model. It is the main drive that highlights WebQuests’ role in assisting students to develop and use not only their cognitive skills, but also their social skills, through interacting and working with other students in groups, beyond any physical geographical location. For instance, WebQuests’ role, enables the students to work with students located elsewhere, such as South Australia.

Scaffolding also produces positive results by providing temporary frameworks to support student performance beyond their capabilities (Cho & Jonassen, 2002, p.6). It is used to encourage the internalisation of intellectual skills through ongoing practice, and, according to March (2004), to implement approaches such as constructivist strategies, differentiated learning, situated learning, thematic instruction, and authentic assessment.

The objective of WebQuests is to encourage connectivity and the communication of ideas between
students and teachers. This resource teaches students how to ask the right questions and offer opinions (McInerney & McInerney, 2002). The first page (fig. 1) of the WebQuests highlights the basic objectives in plain English that is easy for students from years 7 to 9 to understand. The page provides an introduction of the tasks required and some background information on Timber, Woodwork, and Tools.

![WebQuests Image]

Figure 1. Captured from DB2P (2012)

WebQuests also identifies the information sources (tasks and resources) needed to complete the assigned project, all of which can be found on the Internet. It provides the path and links to other World Wide Web sources. It also guides the learner in accomplishing tasks, the rubric and criteria of evaluating their completed tasks, and the means of communicating (through emails) with each other.

The conclusion of WebQuests provides an outline and review of the tasks to bring closure to the quest and remind learners what they have achieved. This also encourages the students to extend their experience to another subject/course.

### 2.2 VIDEO STREAMS (Multimedia) as a Resource

The video streams are captured from the time students start their project work in the workshop. As they work, they are captured by the video camera. The videos are then provided to the students so that they can evaluate their projects in groups later at the end of their class. In the next class, they present their work and ask for feedback from fellow students (this is consistent with collaborative theory). Students determine their own strengths and weaknesses, thus providing them with an avenue to evaluate themselves and to judge how well they are performing in the development of their work. For instance, they will be evaluated on how well they use the woodwork tools, and how well they implement them in the development of their project. This project is often called ‘product’.

The video streams embedded in the WebQuests are then captured and stored in the class computer and presented for evaluation at the end of the term. Each of the students is then provided with a copy of their work for their portfolio.

<table>
<thead>
<tr>
<th>Resource viz Description</th>
<th>WebQuests</th>
<th>Video Streams (multimedia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age and Grade</td>
<td>Year 7 to 12</td>
<td>Year 11 to 12</td>
</tr>
<tr>
<td>Educational setting</td>
<td>High School in NSW</td>
<td>High School in NSW</td>
</tr>
</tbody>
</table>
3. Evaluation and Theories

3.1 Evaluation

The resources selected in this paper emphasise that technology is more than just a piece of hardware. They consist of interesting tools and designs, as well as environments that engage learners. They function as intellectual toolkits that enable students to build meaningful interpretations and representations of their ideas, tasks and problems, and the environment itself. These resources support the development of students’ cognitive and social functions. WebQuests and the video streams, or multi-media as fondly called (both are, in fact, ICT), are tools to support knowledge construction (Jonassen, et al., 1999). They represent learners’ ideas, performance, and work. Both facilitate social interaction and provide a medium for collaboration and discussion amongst the learners and teachers.

These resources are intellectual partners (Jonassen, et al., 1999) that support learning by reflection, with learners being able to articulate and evaluate their performance (for example, the video streams) while also developing their analytical skills and not being limited in their research skills, as demonstrated in the case of WebQuests.

In summary, both resources help make the course/subject relevant and interesting to the students. Through the application of technology, these resources also make education enjoyable. The use of hypermedia and hypertexts, as well as the use of video streams and their accessibility and availability across the Internet, provide students with opportunities to work on their assignments or subjects outside of school with parental guidance. The resources are simple, easy to use, readable; they also have good quality content that is both easy to understand and attractive to students. Help is also readily available via email and interaction with other students. The use of resources is self-explanatory, although teachers need initially to explain and provide suitable instruction and guidance on their use so that learners can appreciate the resources and use them as tools to support their learning process. Prior knowledge or experience, such as computer use, or operating and downloading a video clip, or playing a CD-ROM is not important (or “necessary”?) while these skills might be helpful, they are not essential for the operation of these resources. Video capture is done by teachers and tutors, and WebQuests was developed by a teacher for publication on the Internet.

It may be useful for students to learn how to browse the Internet or replay the video streams so that they can access these resources outside school (i.e., at home). No technology issues are anticipated, given that the use of these resources is dependent on the existing robust and efficient technology we have today; special installation procedures are not required, either. The learning context in which these resources are intended to be used relates to students in years 7 to 12 in Australian high schools (see table 1). The course/subject falls into the category of TAS (Technology, Arts and Sciences) in NSW public schools, but the use of the resources is not limited to that environment. These can also be used as a model for other schools both interstate and
around the globe. Because these can be used in pairs or groups as well as independently, the resources can also serve as a tool for social interaction. No special hardware platform is required, since the resources can be accessed using a desktop or palm-top (PDA) computer. Common Internet access – along with presentation through an overhead projector and, more recently, through Smartboard technology – is good for group discussions during a classroom session wherein students are not working in the workshop, which occurs at least twice a week. Students’ learning capabilities are enhanced by developing the skills of articulation, reflection and evaluation of their own performance, by setting goals and tasks for themselves, by regulating their activities and efforts in order to achieve these goals, and by collaborating and conversing with others to further develop their personal interests. These resources target both the social and cognitive development of students, as well as their physical development (developing, woodcutting, and using the timber to make usable objects such as chairs, clocks, and coffee tables).

3.2 Theories

* Social Learning Theory

According to Wallace, et al. (2000), social learning is sometimes considered as observational learning, and consists of 3 phases.

Firstly, students observe their own performance, and do so by using these resources and evaluating the work achieved. Secondly, they judge their performance on the basis of the standards they set while working on their project. Lastly, they draw their own conclusions to determine whether their projects are satisfactory, or require a re-work. This is very important for students to achieve learning outcomes. These resources can also be used outside of school with the guidance of the students’ parents – facilitating parents and students as they work together, and enabling the parents to see where the student needs to improve. The resources, moreover, represent a situation in which students can observe and judge their performance.

* Intellectual Development Theory

Bruner (Wallace, et al., 2000) theorised about the stages of development not dependent on the type/age of students. He identified three stages of intellectual development: (1) Enactive, where students learn about the subject through the actions on objects (this includes research); (2) Iconic, where learning occurs through the use of models and pictures (including multi-media); (3) Symbolic, which describes the capacity to think in abstract terms (designing projects, improving presentations and performance, and learning from the experience). Both resources meet Bruner’s (Wallace, et al., 2000) underlying principle for teaching and learning - that the combination of concrete, pictorial, and symbolic activities leads to more effective learning. The user-friendliness of WebQuests prevents learners from feeling too intimidated to explore as they perform their tasks, thus encouraging higher thinking and developing critical research skills. Meanwhile, the use of multimedia – by replaying recorded videos to evaluate their work – encourages self-improvement and achievement.

* Information Processing Theory

The use of these resources highlights the importance of acquiring and using information in a learning environment. Information is shared and processed. This is expanded and explored through these resources, which encourage students to research for more information on the Internet in order to support their ideas and concepts and to meet their learning objectives. WebQuests (re: Timber work and research), for example, provides learners with a facility for conducting research and gathering information for their projects. The video capture of their work, meanwhile, provides learners with the opportunity to evaluate, judge, and improve their work. It also provides them with the opportunity to collaborate, elaborate, solve problems together (Wallace, et al., 2000), and share and gain ideas from other learners.

* Constructivist theory

The resources support cognitive-oriented constructivist theories that emphasise exploration and discovery by each student as the key features of the learning process. These resources also encourage collaboration, and
the collaborative efforts of groups of learners utilise these resources in their learning. The use of WebQuests in pairs as well as in groups assists students in their learning (according to social constructivist theory). The use of video recordings of students’ work – particularly when the videos are presented to the class – is also consistent with social and constructivist theories, whereby students learn about the subject through their performance, through judgement of their own work, and through collaborative efforts with other students. The resources presented in this paper and their consistency with the theories thus address three dimensions of the model for pedagogy in NSW public schools. Having been linked to improved student outcomes, these dimensions are identified as follows: “pedagogy that is fundamentally based on promoting high levels of intellectual quality; pedagogy that is soundly based on promoting a quality learning environment; and pedagogy that develops and makes explicit to students the significance of their work” (NSW-Govt 2003). The resources are examples of materials that provide today’s students with the opportunity to use existing tools and obtain the greatest benefit from these tools.

Furthermore, cooperative (collaborative) learning can also be achieved through the use of these resources. Cooperative learning is a form of group learning defined by the presence of 5 key elements (Stahl, 1994): first is positive interdependence (which creates a commitment to the success of the group members); second is promotive interaction (which promotes the sharing of resources through face-to-face contact and online interaction); third is individual and group accountability (which makes each member a stronger individual in their own right; here, students learn together and at the same time achieves greater individual competency); fourth is the use of relevant interpersonal and small group skills (leadership, communication, and teamwork); the last key element is group processing (which requires working together to determine how effectiveness and better performance can be achieved).

4. Conclusion

In evaluating the resources, special consideration has been given to highlight their consistency with the learning theories and gauge their effectiveness at achieving learning outcomes. The theories assisted in gauging the suitability, practicability, and applicability of the chosen resources. Both resources focus on the areas of achieving social and intellectual development (Ivers & Baron, 1998) Moreover, the resources’ consistency with learning theory shows that they achieve the basic three dimensions of pedagogy that are important to the development of a student. Ultimately, the resources encourage what constructivist education proposes. These resources have been successfully implemented in the classrooms during the last school year. However, success in their implementation is different from success in achieving benefits, and the success of the learning outcomes is not immediate or necessarily visible over a given period of time. Similarly, it is difficult to gauge the intellectual progress of the students until their marks are finalised. From psychological, intellectual and social perspectives, however, the design, introduction, and use of these resources expand the definitions of teaching and learning – bringing important learning outcomes that enrich the work of both teachers and students in a given educational context.

References


