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A technology-enhanced multiliteracies learning design for geography education

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Abstract

Educators are being challenged to prepare students to effectively participate in our increasingly globalised society. Contemporary views of pedagogy suggest supporting learners by providing scaffolds for their engagement in real world tasks – tasks that provide opportunities to both explore and apply their learning through multi-modal expressions within their diverse contexts. This article describes a project that draws upon the emerging views of multiliteracies in the design of a K-12 education excursion program. The multiliteracies learning design developed for the program is applied to specific discipline-focused learning objectives and implemented within a technology-enhanced environment, which provides learners with access to the multi-modal texts and tools. A geography-based curriculum application is specifically detailed in this article.

Introduction

Educators are being challenged to prepare students to effectively participate in our increasingly globalised society. Hence, we must foster student learning outcomes that will lead "all young people to engage with an increasingly complex world ... characterised by advances in information and communication technologies, population diversity arising from international mobility and migration, and complex environmental and social challenges" (Ministerial Council on Education Employment Training and Youth Affairs, 1999, p.1).

Contemporary views of pedagogy suggest meeting this challenge by providing learners with scaffolds to engage in real world tasks – tasks that provide learners with opportunities to both explore and apply their learning through multi-modal expressions within diverse contexts. This article describes a project that draws upon the emerging views of multiliteracies in the design of a K-12 education excursion program. The multiliteracies learning design developed for the program is applied to specific discipline-focused learning objectives and implemented within a technology-enhanced environment which provides learners with access to the multi-modal texts and tools. A geography-based curriculum application is specifically detailed in this article.

Background

Multiliteracies and Pedagogy

The need to prepare students for engagement in the complex modern environment relates to the concept of 21st century literacies – a concept which expands traditional notions of literacy that concentrate on text-based reading and writing. Thus, the concept of *multiliteracies* encompasses more than just language literacy and numeracy. It includes, among others, information, visual, and technological literacies (Muspratt, Luke & Freebody, 1997; Reinking, McKenna, Labbo & Keifferr, 1998; Unsworth, 2001). These literacies can be individually defined as follows:

- information literacy - sourcing, analysing and evaluating information with an awareness of how it is inextricably linked to power and persuasion
- visual literacy - constructing coherent visual texts and critiquing visual texts from positions of aesthetic and meaning
- technology literacy - using technology to create multimedia texts and a critical awareness of how issues such as accessibility and control relate to the wider world.

The complex nature of modern society has resulted in a need to support the development of literacies to a deeper or more critical level. Learners need to be able to critically analyse information; logically examine arguments; relate ideas to their own previous knowledge and experiences; develop and use organising principles to integrate ideas; develop and test possible solutions; and, develop conclusions based on evidence (adapted from Biggs, 1979).

A pedagogy of multiliteracies has been developing for over a decade and was initiated by The New London Group (1996). This group advocates a variety of teaching and learning methods in order to accommodate complex learning settings, as well as to cater for the diversity of learners themselves. These methods include *situated practice,* in which learners engage in meaningful authentic tasks related to their own environment; *overt instruction,* which places emphasis on teachers and other experts scaffolding the learning experience; *critical framing,* which provides learners with the opportunity to explore historical, social, cultural, political, ideological and value relationships; and, *transformed practice,* which allows learners to reflect upon and apply what they have learned. Members of The New London Group have taken the theoretical concept of a pedagogy of multiliteracies to a practical level with very specific learning activities intended to support the knowledge building process (cf. Kalantzis and Cope, 2005).

At a more generic level, educational authorities have integrated these theoretical concepts into new pedagogical frameworks that seek to both guide teaching practice and to provide self-evaluation and/or peer-review structures within which teaching practice can be discussed and refined. With the basic goal of improving

the quality of teaching in order to facilitate improved learning outcomes for students, these frameworks view knowledge as constructed, produced and critiqued rather than as static and transferred.

The nature of integration of multiliteracies into pedagogical frameworks varies between different educational authorities (cf. Education Queensland; NSW Department of Education and Training, 2003), however links with a pedagogy of multiliteracies are evident in curricula throughout Australia. State educational authorities are drawing on multiliteracies pedagogy by creating frameworks that focus on:

- engaging students in real-world problems (i.e., *situated learning*);
- providing supportive and high quality learning environments where teachers provide explicit quality criteria and facilitate social support between themselves and students and among students (i.e., *overt instruction*);
- allowing learners to recognise and appreciate the differences of the individuals and groups with whom they interact (i.e., *critical framing*); and,
- supporting learners who engage in higher order thinking where they develop deep understanding through engaging in substantive communication (i.e., transformed practice).

Geography Education

Consistent with the emerging views of multiliteracies, geography education is one context in which students develop knowledge and skills relevant to and in consideration of their societal situation. Geography education expands the concept of literacy with 'geography literacy' (Backler and Stoltman, 1986) – a literacy form with its own specific language and multi-modal expressions of that language. This is consistent with Unsworth's (2002) contention that multiliteracies is "... differentiated no only on the basis of the channel and medium of communication (print, image, page, screen) but also according to field or subject area (history, geography, science, maths, etc)" (p.66).

In Australian secondary schools, learners explore spatial and ecological dimensions of the geographical world and interrelate local, regional, national, continental and global scales (Board of Studies NSW, 1998). The educational objective is the development of specific skills including:

> **Acquiring** geographical information through reflecting on prior learning; asking geographical questions; and, identifying and gathering geographical information.

> **Processing** geographical information by analysing, organising and synthesising geographical information.
>
> **Communicating** geographical information, comprising answering geographical questions and applying geographical information.
>
> **Participating** as active and informed citizens through acquiring knowledge about citizenship and applying this knowledge to take action.
>
> (Board of Studies NSW, 1998, p. 8)

For students, learning through multiliteracies is thus critical for the development of these acquiring, processing, communicating and participating skills. Teachers can facilitate this learning through the implementation of multiliteracies pedagogies such as those currently introduced in Australian school systems – and geography education literature provides some guidance, especially in terms of visual and technology literacy.

Osborne (1998) suggests that visual literacy is particularly important when students engage in landscape analysis, while Barnes and Duncan (1992) discuss the notion of reading landscapes as text. Yet, there is recognition that the "opportunities provided by visual images in the geography classroom are not always fully exploited by teachers" (Yates, 2000, p. 68). The challenge for the designers of this project is, not only to create learning experiences for students that explicitly involve the analysis and use of images, but also to ensure that geography teachers are supported when implementing tasks with which they may not have had prior experience.

Another consideration for geography education is in the exploration of the technology tools that might support learners develop these acquiring, processing, communicating and participating skills. Students using geographical information systems (GIS) software can manage and manipulate data that describes places and patterns on the earth's surface (West, 1998). These cognitive tools are considered to support students in structuring their geographical investigations (West, 1998), and the learning process is further enhanced when other multimedia resources are provided in conjunction with access to a GIS (Lo, Affolter & Reeves, 2002). This can result in students becoming more 'hands-on' in the learning process and, as a result of this, developing and demonstrating multiliteracies – particularly technology literacy. However, there is acknowledgment of insufficient '*take up*' of such technology tools that might support geography education, even though they have become more accessible in the school education environment (WithamBednarz, 2004).

Gerber (1995) sums up the relationship between literacies and geography education in saying "... the greatest benefit of injecting technological and graphic literacy into the geographical education process will be the empowering of the learners... evidenced through enhanced problem-solving capacities of the learners using more relevant data in a more skilled manner" (p. 56). For the project design team, this statement underpins the pedagogical design of learning experiences. Both learners and teachers must be appropriately resourced and supported for engagement in learning tasks.

The Project – Re-thinking the school excursion

Within the K-12 education context, the traditional school excursion or field experience has focussed on hands-on activities that give students the opportunity to engage in the 'real-world' outside of the 'theory' of the classroom. Learning on such excursions can be engaging and effective, with students making multiple and meaningful connections, which lead to understandings that could not be achieved in the classroom environment. However, many geography excursions involve meaningless measures and calculations, and the completion of de-contextualised worksheets that result in little more than disengagement and boredom on the part of the students (Brickell, Herrington & Harper, 2005).

The site of Sydney's 2000 Olympic Games provides a setting in which the concept of the school excursion can be reconsidered. The Parklands at Sydney Olympic Park comprises both natural and built environments, including pristine woodlands; salt marshes and mangroves that play host to a diversity of flora and fauna in close proximity to reclaimed industrial sites; and housing and industrial estates. It is also a place of Aboriginal significance and historic importance.

The New South Wales state government agency responsible for the site, Sydney Olympic Park Authority, is charged with designing and implementing programs that allow citizens to enjoy The Parklands through a range of educational, cultural and recreational activities. One of the initiatives has been to engage the state educational authorities and a higher education partner, the University of Wollongong, in the development of the School Excursion Education Program. This program aims to take advantage of the richness of the history, culture and resources of The Parklands by providing formal educational experiences for K-12 school students. It is intended that similar educational experiences will eventually address each of the NSW Board of Studies' Key Learning Areas (Creative Arts; English; Personal Development, Health and Physical Education; Mathematics; Human Society and Its Environment (HSIE); Science and Technology; and, Languages). Geography, a HSIE subject, is the first discipline of focus for the School Excursion Education Program.

Fundamental to the program is the focus on the use of innovative information and communication technologies to facilitate the learning process; support for and participation of teachers in tailoring and guiding the educational experiences; and the emphasis on a continuous learning experience in which students engage in challenges both in the classroom and at The Parklands.

Learning Design

The concept of the 'learning design' (see Oliver, Harper, Hedberg, Wills & Agostinho, 2002) provides a framework to describe the pedagogical sequence established for the project. Learning designs, as depicted in Figure 1, are made up of elements of learning tasks (represented as rectangles), resources (represented as triangles) and supports (represented as circles).

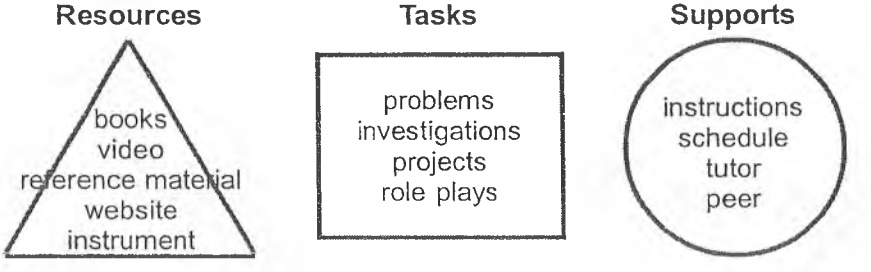

Figure 1: ***Visual representation of learning design elements –resources, tasks and supports.***

Tasks are the activities students undertake in the teaching and learning situation (e.g., solving a problem, writing an essay, etc.). **Resources** are content related and thus provide students with the information or data necessary to undertake their tasks (e.g., books, websites, etc.) or tools necessary to capture the information or data required (e.g., microscope, data, digital camera, etc.). **Supports** are things or people who facilitate the students' processes of undertaking the tasks (e.g., written instructions, peer-led discussion, teacher feedback, etc.).

The learning design for the Sydney Olympic Park excursions takes the form of a large-scale learning challenge with a sequence of eight tasks. The generic learning design for the geography challenge is depicted in Figure 2.

Student teams are presented with a challenge that comprises a five to eight week sequence of tasks to be undertaken prior to visiting the site, while one site, and after returning to their classroom. Although depicted in a linear fashion, the interconnecting lines and arrows demonstrate that student teams move back and forth between tasks as they deem necessary. The only temporal limitations in undertaking tasks apply to those which are explicitly related to the scheduled visit to The Parklands (e.g., collecting data).

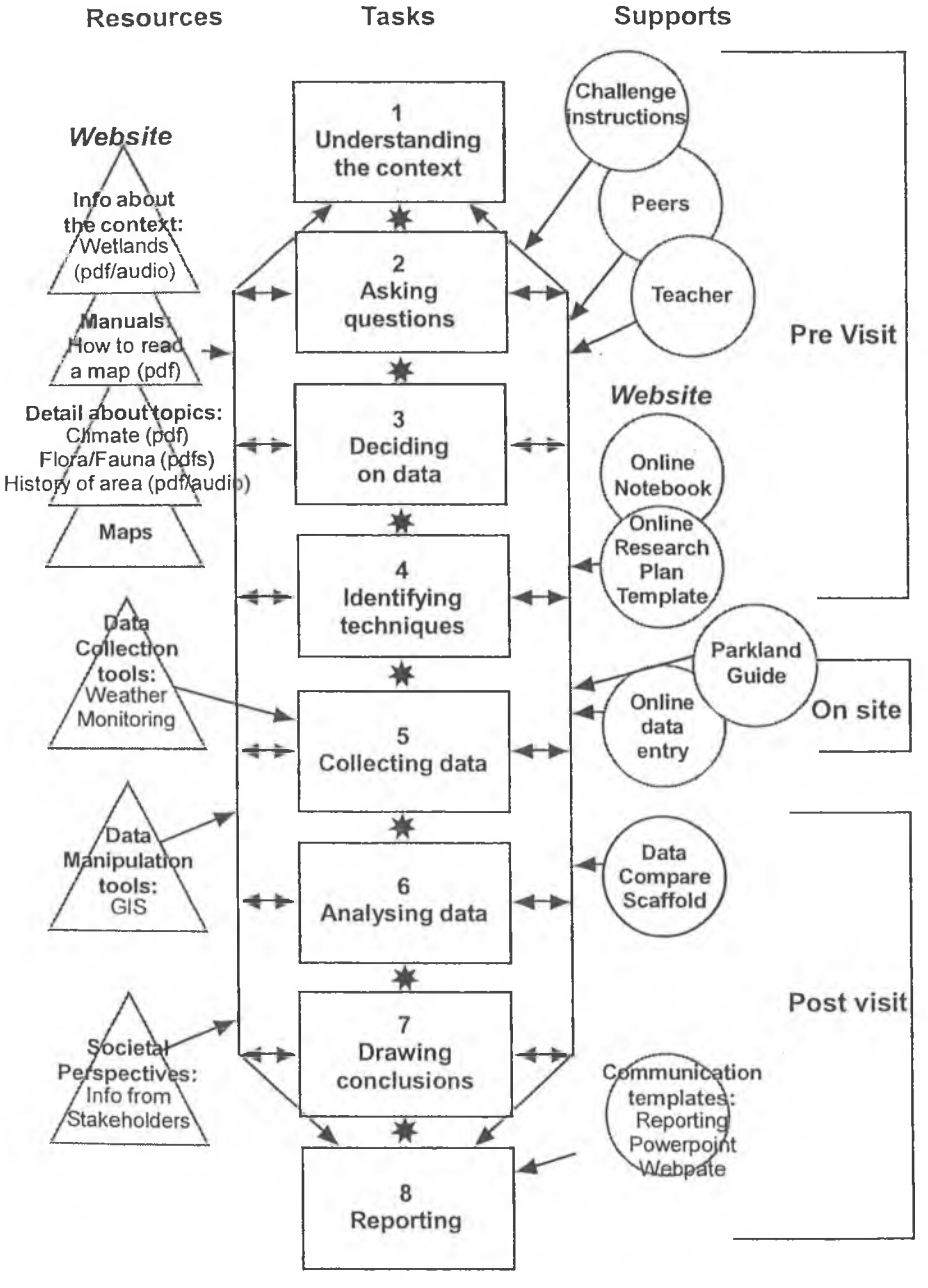

Figure 2: ***Learning design for Sydney Olympic Park geography challenge.***

The use of the pedagogy of multiliteracies, and of quality teaching frameworks, as a guide means that the challenge is designed to:

- be problem based;
- be authentic and connect to the real world beyond the classroom;
- represent an educational outcome and substantive intellectual activity of educational value which can be demonstrated;
- incorporate the production of learner artefacts which require demonstration of a variety of communication skills;
- require students to engage in and demonstrate critical analysis; and,
- involve topics of interest to learners of the age group targeted (Brickell, Lockyer, Herrington, Brown & Harper, 2004).]

The eight learning tasks presented to the students are designed to specifically support the skills of acquiring, processing, communicating, and participating as outlined in the geography syllabus (see Table 1).

Skills:	Acquiring	Processing	Communicating	Participating
Learning design tasks				
1. Understanding the context	✓	✓		✓
2. Asking questions	✓	✓	✓	✓
3. Deciding on data	✓			
4. Identifying techniques	✓			
5. Collecting data	✓	✓	✓	
6. Analysing data		✓		
7. Drawing conclusions		✓		✓
8. Reporting		✓	✓	✓

Table 1: ***Relationship between eight tasks of the learning challenge and geographical skills.***

An interactive website provides students with a range of multimedia resources to support their exploration of the learning challenges. The website also provides the learners and their teachers with guidance for each of the eight learning tasks (named steps within the challenge, and so titled within the website). Additionally, the website includes online scaffolds to structure the research process; and, includes tips on using the various data collection tools that are available to the students during their on-site visit.

The generic geography learning design is contextualised for the first challenge by asking students to investigate land and water management at The Parklands. Learners are assigned the role of expert geographers and are presented with a real-world/ authentic geography problem. The website supports the assignment of this role to students with a letter to learners in their role as consultants (Figure 3).

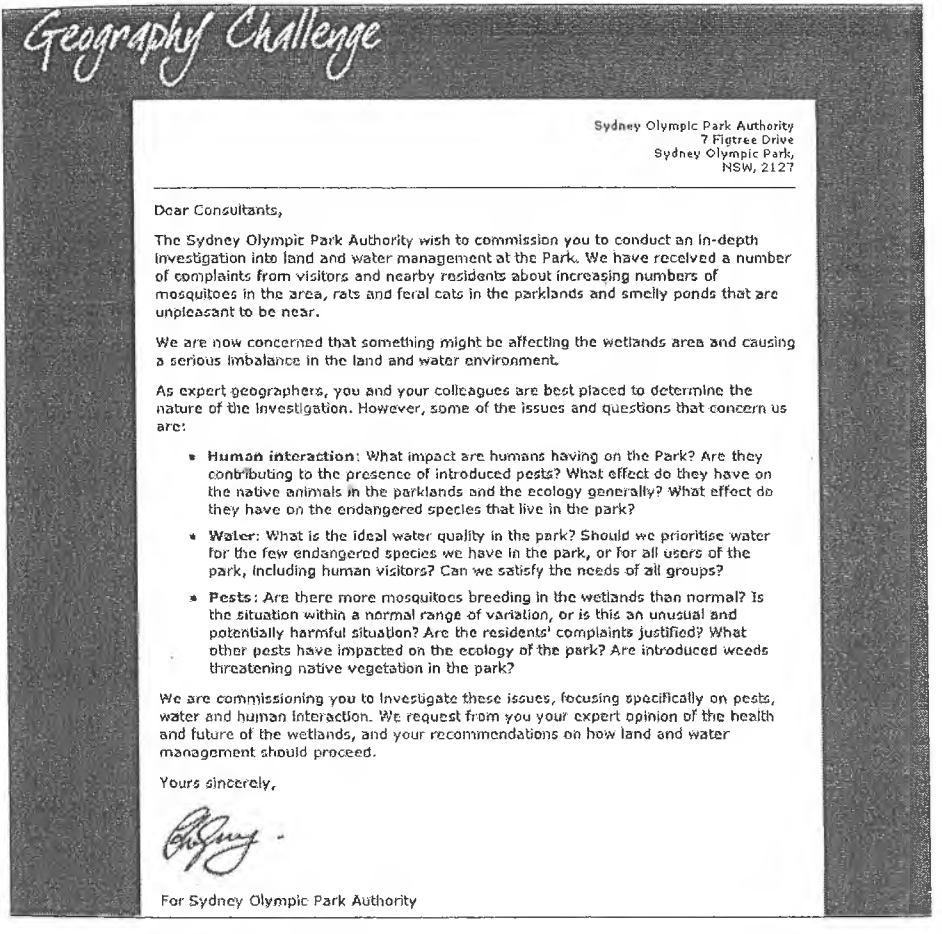

Figure 3: ***Geography challenge presentation – letter to consultants.***

Students are then provided with more detail about the challenge with an *Introduction* page that provides information about the context of the Scenario set in The Parklands; specific questions for the students to consider in solving the Problem; and, an abbreviated reminder about their challenge, and the form of the presentation of their final response (see Figure 4).

Website multimedia *resources* include detailed information to assist the students with each task including: detailed descriptions, maps, and photographs of the

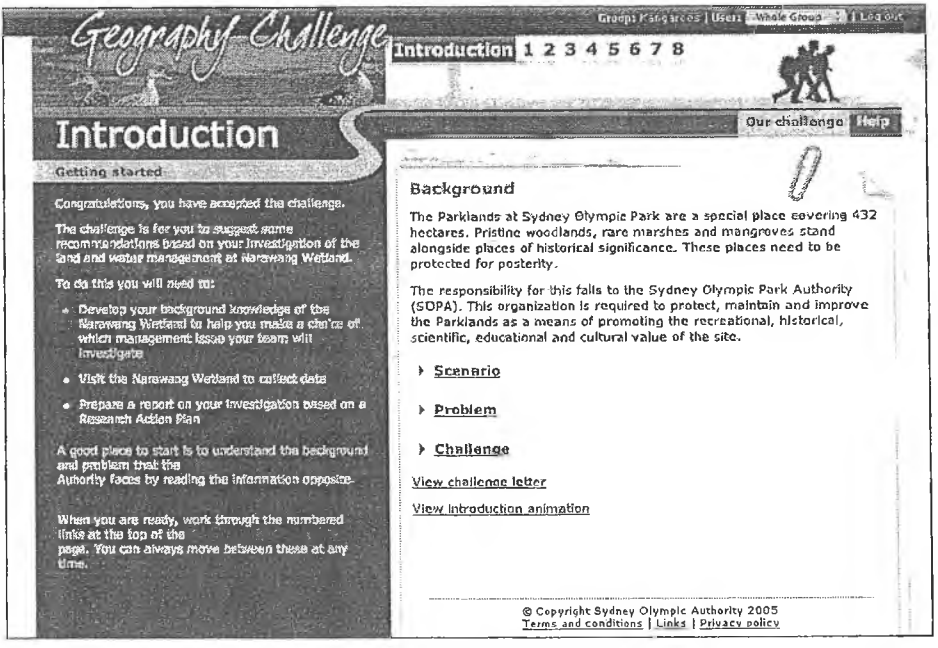

Figure 4: ***Geography Challenge website Introduction.***

park wetlands; audio, video and textual descriptions of the history of the site including past industrial usage; and, textual descriptions and photographs of past and present wildlife inhabitants of the wetlands. The provision of these multi-modal texts supports the notion of a multiliteracies based development of knowledge and skills. Students may use the embedded search engine to locate any resource in the entire collection or access resources on a task-by-task basis.

The website *supports* the students' investigations with the provision of generic tools, such an electronic notebook that students may access during any task. The website is structured to support students in undertaking the Research Action Plan (i.e., the eight tasks of the challenge). In addition to the resources associated with individual tasks, there are specific tools that support the learning process embedded within the pages associated with each task. On-site, during the excursion, students have access to GIS and data collection tools including weather monitoring and water sampling and testing.

Task-by-Task

As students work through the eight tasks of the geography challenge they utilise the multi-modal texts provided on the website and the interactive tools in order to construct their own multi-modal texts. For Task1 –(*Understanding the Problem*), students are presented with a number of learning activities that allow

them to become familiar with the issues raised in the Challenge and develop an awareness of The Parklands. Figure 5 is a screen capture of the main web page that presents these activities to students.

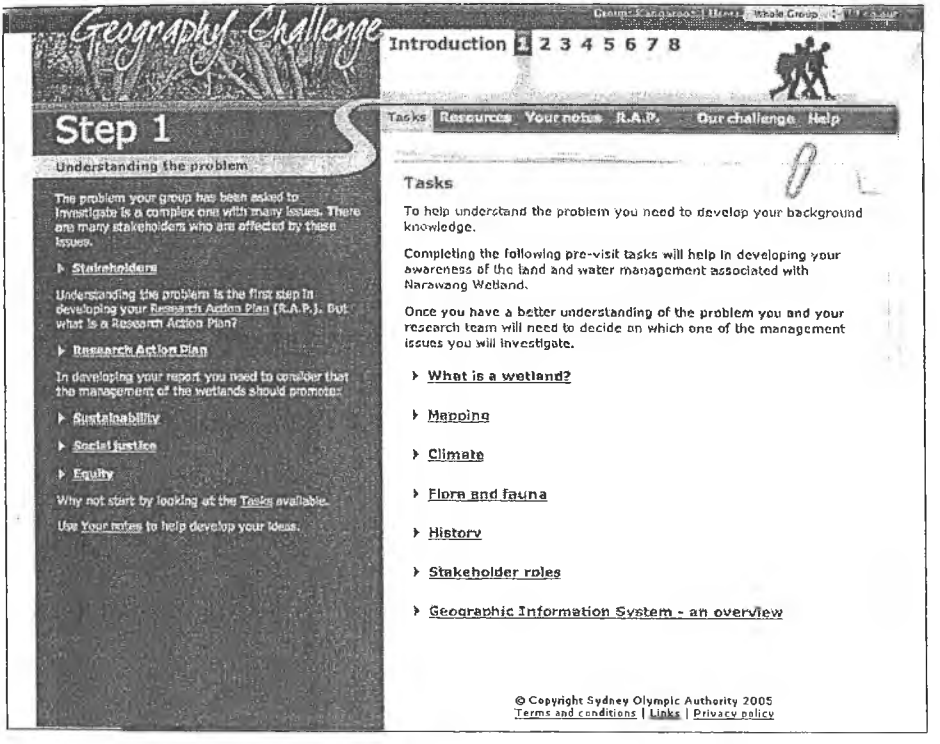

Figure 5: ***Understanding the Problem task main web page.***

For example, when undertaking the *What is a wetland?* activity, students access resources that include photographs of the Narawang wetlands at The Parklands; textual descriptions of elements of the wetlands; and, audio interviews with stakeholders describing their views on the importance of the wetlands. Such resources provide the necessary information for students to describe the differences between natural and artificial wetlands; define wetlands; list ten misuses of wetlands; and, suggest how they will go about identifying common species of the Narawang wetlands. Online forms are provided for students to enter their responses for the activity so that they can be shared with the class.

In Task 2 (*Ask Questions*) students generate key research questions that will help them understand the issue of land and water management. Student groups within the class can take on a specific theme to explore (e.g., pests, water, human interactions), and the outcomes of the groups' investigations of the themes can then be shared through the website. For example, student groups investigating

pests use the online tool to combine a statement of concern with a matching species, and to identify suitable strategies for managing the concern.

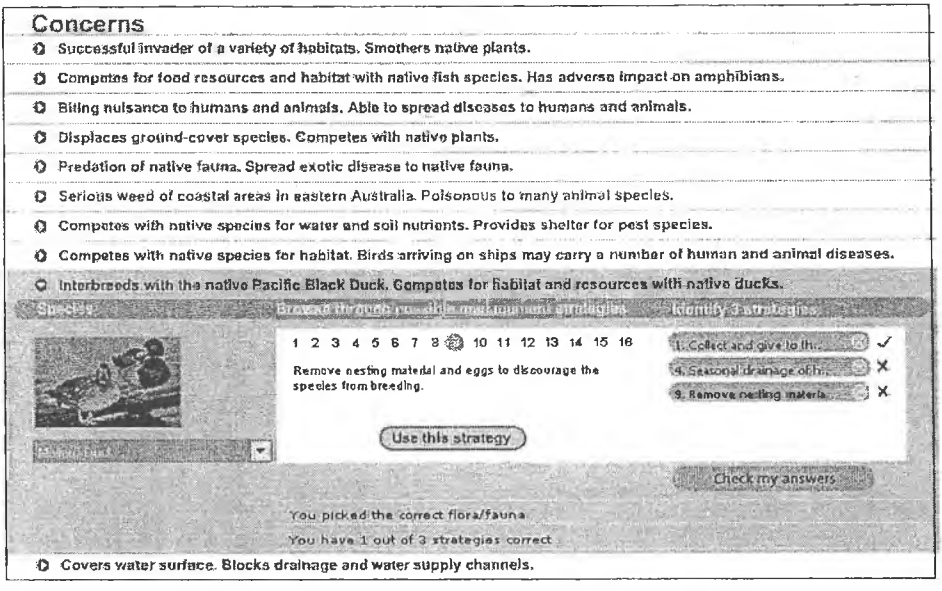

Figure 6: ***Website support tool for identifying concerns and suggesting strategies.***

For Task 3 (*Deciding on the Data Required*), students establish what data needs to be collected during their on-site visit to The Parklands. The resources on the website provide the necessary background information for students to develop an understanding of types of data (i.e., primary and secondary), and the sites of primary data in The Parklands for their chosen theme. Students can collect the relevant information in their online notebook to use as a reminder when they are engaging in the data collection process on-site.

During Task 4 (*Identifying Techniques*)student develop an understanding of the process of collecting data. Resources accessible on the website provide detailed visual and textual descriptions of each technique, including how to make an accurate recording and how data types are stored and analysed. Again, students can add the appropriate information to their online notebook for future reference when they are on-site.

Task 5 (*Collecting Data*) is undertaken by the students at The Parklands. The website provides online data recording tools. Hence, students have easy access to their data when they return to school from the on-site visit. For example, students investigating the pests theme might use dip-netting to understand the biodiversity of the wetlands. An online biotic testing tool provides a place for

students to record the number of each type of water bug identified (see Figure 7 for screen capture of tool) and text boxes to respond to questions that support their initial analysis of the data (see Figure 8).

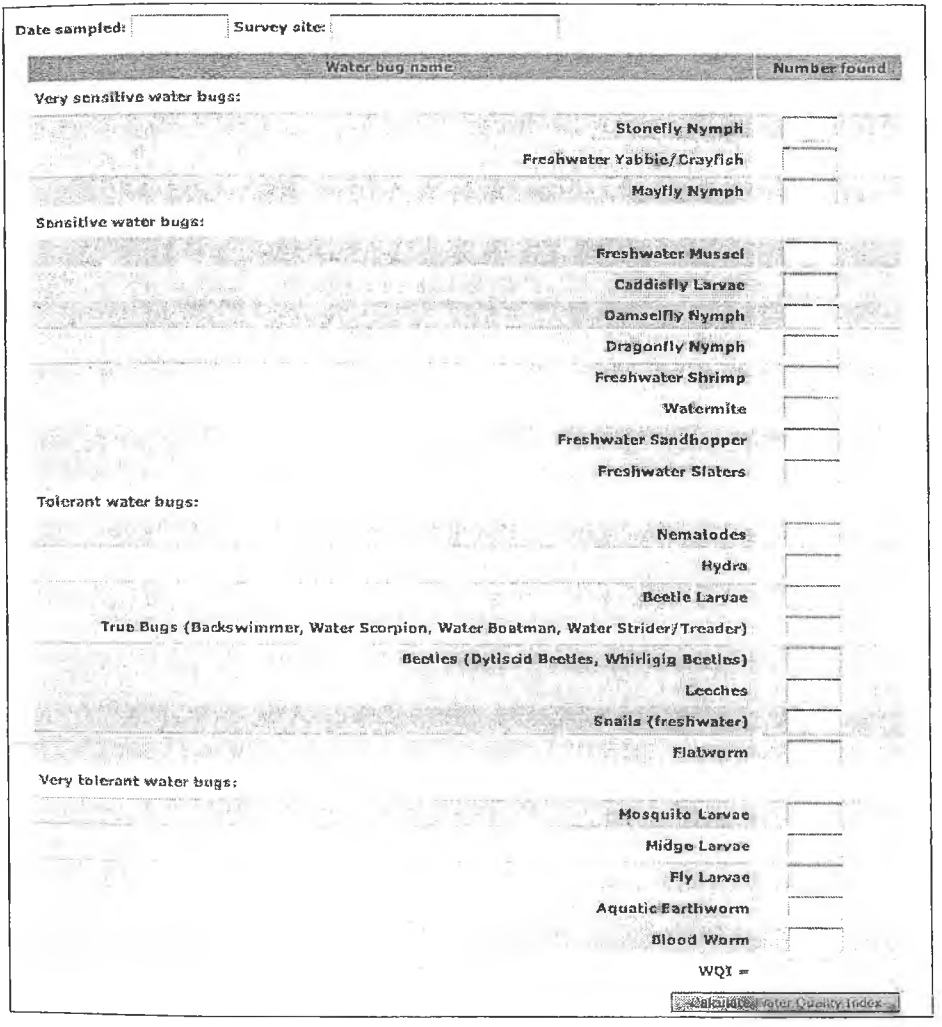

Figure 7: ***Example online data collection tool.***

In Task 6 (*Analysing the Data*) student groups analyse their data by comparing with other groups in the class that investigated the same theme, and/or with historic secondary data previously gathered. Online tools support the analysis and comparison process by collating and presenting the groups' primary and historical secondary data in one location.

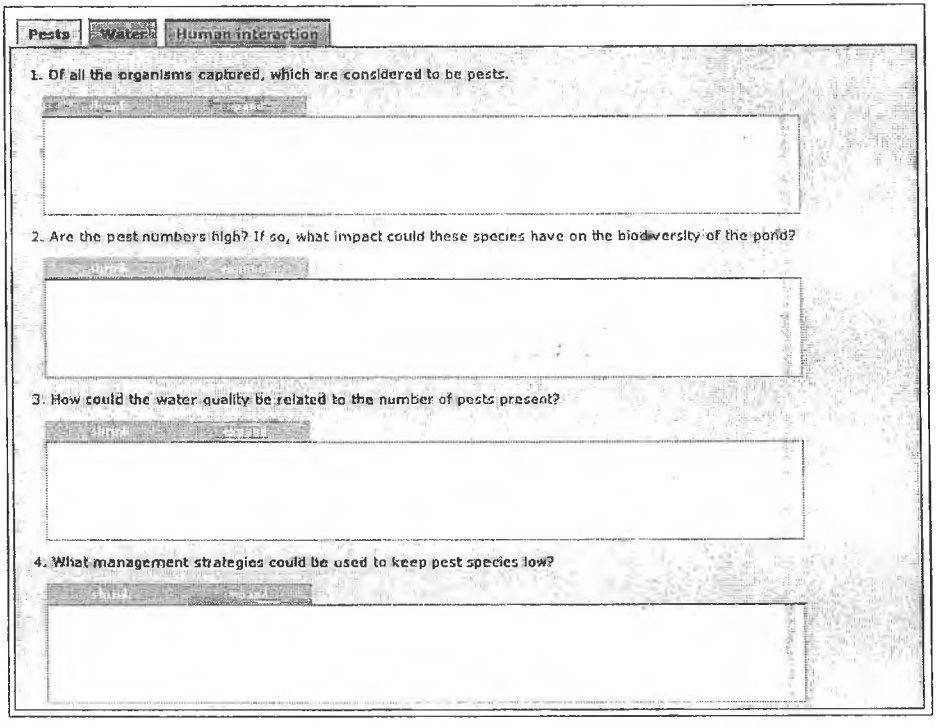

Figure 8: ***Example online data collection tool – initial data analysis.***

During Task 7 –(*Drawing Conclusions*) students are supported in interpretation of the data collected with respect to their research questions, and in developing a recommendation for a course of action. Particular emphasis is placed on students relating their conclusions to the views of relevant stakeholders. The range of stakeholder views are presented though text, audio, and images – and an online tool helps students collect these views in their notebook for subsequent use in their final report.

Finally, in Task 8 (*Reporting your Research*) student groups complete the challenge by preparing a final report for Sydney Olympic Park Authority with their recommendations and proposed actions for land and water management in The Parklands. Student groups are expected to present their report to the class. Students can choose the format for their report – a word-processed document; a powerpoint presentation; or a website. Student may download templates for each format from the website to use as a starting point for their report. Online guides are also provided to help the students structure and support the argument for their report.

This task-by-task description demonstrates how specific resources and supports are integrated to support the geography challenge related to land and water management at The Parklands. The generic structure of the learning design can be adapted to a range of other geography challenges around specific topics or, for that

matter, other disciplines which address similar literacies and skills. The individual tasks could be adapted to account for the literacies of other disciplines within the Key Learning Areas that are the focus of the School Excursion Education Program.

Conclusions

If we are to meet the challenge of preparing students to effectively participate in our increasingly globalised society, we need to create learning settings that allow them to simulate such participation. The learning environment described here has a contemporary view of pedagogy embedded in the design, which provides scaffolds for learners as they engage in real world tasks. These tasks provide learners with an opportunity to both explore and apply their learning though multi-modal expressions within diverse contexts. The project described draws upon the emerging views of multiliteracies in the design of a geography education excursion program. The multiliteracies learning design for the program has been implemented within a technology-enhanced environment, to provide learners with extended access to the multi-modal geography texts and tools that support the learning sequence. Such learning environments should prove to be ideal settings for fostering learners' development of multiliteracies.

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