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Using a virtual national park to teach workplace skills in conservation management

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Abstract

Teaching conservation management means more than just learning about solving complex and difficult environmental issues. Such learning must also consider the likely administrative context that students will end up working in. This article outlines the development of a role-play that uses online technology to teach several administrative processes associated with conservation management. As such, the paper shows how a role-play within a digital environment can be used to provide scenarios that are difficult to obtain through a work placement.

In developing this role-play, a number of errors occurred most noticeably with insufficient consideration about how to facilitate the use of it in the classroom. Having made some changes, evaluation now suggests that students find the role-play more stimulating than the traditional lecture-style format of the same material. An important lesson is that the use of role-plays within a digital environment is not simply about using technology, but about people and the way learning is supported.
Introduction

Like many other places around the world, people’s activities are causing irreversible environmental degradation in Australia. Humans have directly or indirectly caused most of the recent mammal extinctions and only a fraction of most native vegetation communities remain (Kingsford et al., 2009). Moreover, the most pressing environmental issues, such as declining water quality, deteriorating ecosystem health, loss of ecosystem resilience, and climate change have become wicked and messy problems (Rittel & Weber, 1973). In other words, these issues are complex, with contested goals, unclear temporal and spatial scales, and significant uncertainties about the effects of actions (Dovers, 2001; La Chappelle, McCool & Patterson, 2003). Under such circumstances, the process of deciding how to change is often more important than the actual actions used to create the change.

The process of deciding how to address Australia’s environmental issues is influenced by the nation’s governance arrangements. These arrangements are based on two broader societal themes: sustainable development and, more particularly, neoliberalism (Dovers, 2001). A number of principles consistent with these two broader themes affect most conservation agencies and include:

- Cost cutting, capping budgets, and seeking greater transparency of resource allocations;
- Disaggregation of traditional organisations into corporations (e.g. state-owned enterprises);
- Separating purchasers and providers;
- Introducing market and quasi-market mechanisms;
- Decentralising management authority;
- Introducing performance management;
- Introducing personnel policies that shift away from permanence toward contracts and performance-related pay; and
- Increasing emphasis on service quality.

In sum, accountability for performance is being demanded across all sectors of government and conservation management is no exception. Quality management and accountability in administration,
combined with a need to resolve wicked, messy and uncertain issues, make conservation management a complex work environment.

This context creates a challenge for tertiary education teachers focused on training students for conservation management: how to teach the resolution of wicked and messy problems within these particular governance arrangements? This paper outlines the conceptualization, delivery, and evaluation of an on-line role-play centred on students being conservation managers. Evaluation of this approach has found students find this format more stimulating and relevant than the traditional lecture style format. As such the paper shows that role-plays using a blend of teaching and learning technologies can facilitate powerful learning experiences that are relevant to the workplace.

**The rationale for using role-plays and virtual environments**

The importance of learning in the experience of work (i.e. work integrated learning) in University education is increasing. This change stems from two key drivers: first, pressure on universities from both students and employers to produce readily employable students; and second, curriculum designers no longer believing classroom education is a largely cognitive form of learning while professional practice is largely skills-based learning (Ben-David, 1981; Billet, 2001).

When planning to incorporate work integrated learning into a degree it is important to consider the desired outcomes because it enables a teacher to tailor a program to match those outcomes. The outcomes generally associated with work integrated learning range from adding a vocational slant to what might otherwise be a predominantly academic curriculum to training in specific competencies (i.e. professional practice), and/or providing students with the opportunity to learn about different jobs, different industries, and specific occupations (Dressler & Keeling, 2004; York & Knight, 2006).

Most environmental management courses in Australia apply work integrated learning by making students do part of their degree in a work place (Scouller, 2007). Such experience can be limited. Billet (1995) groups these limitations as being inappropriate knowledge, lack of access to...
authentic activities, reluctance of experts to contribute, absence of expertise, opaqueness of some knowledge, and inadequate instructional media.

A role-play is a form of experiential learning in which people enter an imaginary world and immerse themselves in a learning environment. Role-plays can overcome some of the limitations associated with a work placement by getting students to act out the role of a character or take part in a particular situation and learn by doing the task that they are immersed in (van Ments, 1999). They therefore can provide students studying conservation management with scenarios that they may not face within a limited period of a work placement. Moreover research generally shows that students enjoy role-plays and teachers find it rewarding (van Ments, 1999; Kurtz, 2004; Hirsh & Lloyd, 2005; Dracup, 2008).

Recent developments in the digital environment have enabled the design of sophisticated role-plays where learners deal with the complexities and ambiguities of real-life issues. Online technologies such as Web 2.0 and gaming are providing new opportunities for role-plays (Asakawa & Gilbert, 2003). The potential for innovative use of digital environments can be particularly useful in creating important interactive virtual environments that make role-play scenarios seem realistic through the use of contextual material that draws from real life situations (Stainfield et al., 2000; Stumpf, et al., 2008). When such role-plays are complemented by professional practice as part of a work integrated learning program, graduates may be produced with a combination of sound professional experience and a broad range of problems solving skills.

**Environmental studies at Charles Sturt University**

Charles Sturt University is located in regional New South Wales and is one of the biggest universities in Australia. Its vision is to be a national university for regional Australia, specialising in education for the professions. Information technologies are therefore an important component of the infrastructure because they enable the university to deliver education to students across a geographically disperse area. Moreover, as a university for the professions, many of its students are
often undertaking study while fully employed and need to have flexibility in terms of when learning occurs.

The School of Environmental Sciences conducts teaching and research into management of the environment. The school offers three undergraduate courses including environmental science, parks and recreation, and adventure ecotourism. Our experience is that students in all three degrees have a variety of career aspirations. Graduates in parks and recreation find work in water management, environmental education, park management, land rehabilitation, GIS, and flora and fauna research. Adventure ecotourism graduates find work in environmental tourism, teaching, park management, local government, or run their own businesses. The work place component of the degree emphasises career development and is therefore viewed as a journey rather than a destination. It is therefore structured so that students are encouraged to explore possibilities, be informed by the experience of others, and make choices to suit their particular interests and abilities. In 2003 a number of employers expressed a need for graduates to have some core workplace competences, including the ability to work in teams, write clear and concise reports, analyse inventories, and manage finances.

Rather than change to a more prescriptive program of work placements, the School of Environmental Sciences responded by creating a core subject, focused on workplace administration and management, for all of its undergraduate degrees in 2003.

In the first few years of offering this subject (2003-2005), the new subject was taught using a traditional lecture format. The curriculum covered what might be thought of as introductory management and included topics such as management theory, budgeting, human resources, and inventory management. Evaluation of this subject over two years suggested the students found the material boring and irrelevant. The challenge for teaching was to present the material in a way that appealed to all students from both a cognitive and affective perspective. To address the issue an experiential learning approach using a role-play was seen as a way to facilitate deeper learning and encourage interest in the subject matter by the students.
The role-play

From the beginning, it was felt important that the role-play be informed by empirical research and evidence gathered from natural resource management agencies rather than from some standard text. The first phase, which involved curriculum development, therefore consisted of interviewing people employed in natural resource management and tourism. The interviews were used to identify a number of topics that were used to develop a draft curriculum. This draft contained material around human resources, asset management, resource management, and policy. This draft was sent to several alumni working in the field, and to agency staff, for comment. The result was a curriculum came together as a series of tasks that were essentially short problems centred around authentic or realistic management situations based on real-life situations that had occurred within a number of agencies (see Table 1).

The second phase involved weaving these tasks together into an interesting overall scenario for the students. Slightly different scenarios were created for each of the three undergraduate degrees (see Table 1). The tasks within each scenario were then slightly modified so they were consistent with each scenario, the overall aim of the particular course, and presumably the broad interests of each student. The three scenarios include managing a national park (for the B. App Sc Parks and Recreation), a catchment management authority (for B. App Sc Environmental Management) and an ecotourism resort within a park (for the B. App. Sc Ecotourism). The stories start with the students being appointed to manage a new organisation with a budget of $20m.

All three stories draw on common contextual material. This material was drawn from various places in the Sydney Basin. This region was chosen because it is probably the best known in Australia in terms of biophysical data, it is biologically diverse, and highly populated. For GIS information, such as park boundaries, the location of assets, soil types, waterways, contours, and vegetation types, one local government area was used. Other supportive information such as, flora and fauna lists, indigenous heritage, recreation patterns, and visitor use statistics, were obtained by drawing from
information provided in a number of plans of management for national parks within the Basin (e.g. Lane Cove and Ku-ring-gai Chase National Parks). Photographs of assets such as visitor centres, walking tracks, and tourist accommodation were also obtained to support all this information by visiting the Basin. All this contextual material was subsequently placed on a CD rom and arranged so that access to it differs with the particular scenario in focus. For example, information about accommodation facilities can only be accessed by students doing the ecotourism resort scenario. Similarly the GIS datasets shows slightly different roads, tracks, and places of interest depending on the scenario in focus.

Within each scenario there are eleven problems which are grouped into five tasks (Table 1). Information on the task and the relevant theory behind these tasks is provided to the students in written form. The tasks are contextualised according to the scenario. For example, in one task students managing the virtual national park write a project proposal around conserving a karst system, while students managing the ecotourism resort write a proposal to conduct nature based tours of a karst system. Any resource material needed to solve these problems (e.g. information on the number and types of karsts) is provided on the CD rom amongst the other contextual material. Like the other contextual material, the information has been drawn from actual databases existing within natural resource management agencies.

For any role-play to be successful, an appropriate set of support materials and learning environments must be generated to enable students to grasp the essence of each problem. The CD rom (which contains the contextual resources) and the written material (which contains the task and the academic literature) are therefore supported by:

- podcasts from people working in the field;
- examples of how other institutions solved similar problems;
- face-to-face and chat room discussions about solving each problem; and
- directions on how to use online search tools to find relevant information.
This other material has evolved over time so that there now is a range of material suited for different types of learning (see next section). This other material is provided through Sakai which is an on-line collaboration and learning environment used by many universities to create virtual learning environments or learning management systems. By integrating all these elements into an overall pedagogical structure containing other case studies, interactive sessions, relevant literature, and search tools, the subject creates conditions for deeper learning of material that might otherwise be seen as dull.

**Evaluation of the change to a role-play**

As the challenge for teaching was to present the material in a way that appealed to all students cognitively and affectively, the evaluation in this paper focus on students’ perceptions of their learning in this subject from 2005 (when it was presented in a traditional lecture style format) through to 2006-2008 (when it was presented as a role-play). This evaluation was carried out using a survey that contained both quantitative and qualitative questions at the end of each semester.

The quantitative part of the survey asked students to rank on a seven-point Likert scale how much they disagreed (1 point) or agreed (7 points) with 11 statements. These statements were:

- the subject stimulated my learning,
- the quality of teaching was good,
- the teaching addressed the objectives,
- clear guidelines were given,
- the assessment assisted in my learning,
- appropriate guidance to improve my work was given,
- the feedback was appropriate,
- the workload was appropriate,
- the flexible learning material was appropriate,
- there were opportunities to talk to staff,
• I developed my capacity in this subject.

The qualitative component consisted of two open ended questions asking what students liked about the subject and what students disliked about the subject.

When the role-play was first implemented in 2006, students reported the experience as being largely unsatisfactory (see Figure 1). They particularly gave low ratings to questions asking whether clear guidelines about the subject were given and the appropriateness of flexible learning materials. The specific comments about the subject suggested there were errors in the scenarios, the assessment tasks were not clear, and the teaching support was not appropriate. Several comments revealed frustration in trying to understand the tasks and criticism of the teaching (see Table 2). The overall message was that a role-play had not improved delivery of the subject.

After 2006, many of the errors in the role-play were overcome. All the errors that students had mentioned with the scenario in 2006 were systematically addressed. Better guidelines were given about each assessment task, including how to present the information, the suggested amount of time required, and the criteria that would be used to assess the task. The teaching was also changed to emphasise interaction and facilitation rather than instruction. Students’ who then took the revised subject in 2007 gave higher ratings about their perceptions of the learning experience on all quantitative questions than those reported in 2006. Additionally these ratings were above those responses obtained in 2005 when the subject was taught through lectures (see Figure 1). Comments suggested that there were still some errors, but overall student suggested the approach to teaching was more stimulating and that they had learnt something new (see Table 2). Improvement continued into 2008 when further changes were made including specifically allocating students to do introductory and post-problem briefings for each task, and having podcasts from graduates actually working on similar problems within the work force.
Discussion and Conclusion

Most of the literature on using role-plays to teach conservation management focuses on the use of role-plays to teach negotiation and conflict resolution (e.g. Brierley et al., 2002; Obrele, 2004; Hirsch & Lloyd, 2006). This is achieved by making students take on particular perspectives, become conversant about an issue, and get involved in discussions about a particular land management proposal. Most of the literature on virtual national parks take the form of virtual field trips to areas some distance away from the learning institution (e.g. Stumpf et al., 2008). This study has combined the strengths of a role-play with the digital technology to teach essential administrative skills such as strategic thinking and working under an accountability and performance regime in conservation management.

The use of on-line role-plays has had a relatively short history, but research to date suggests that role-plays offer opportunities in terms of deeper learning and motivating students. On-line role-plays can provide opportunities for acquiring or enhancing both generic and discipline specific skills relevant to professional practice (van Ments, 1999; Armstrong, 2003; Asakawa & Gilbert, 2003). Specific examples from this particular study include interpersonal and communication skills, prioritising allocating scarce resources, project design, and working to a defined timeline or within a defined budget. Consideration of new pedagogies such as problem-based and cooperative learning using digital environment is likely to increase given the rapid change in technology.

Digital environments may also offer some advantages for teachers including efficiency under decreasing resources, an ability to better deliver distance education, flexibility in access by students, and the ability to deliver immediate responses (Laurillard, 2002). It has also been suggested university students have increasing expectations in terms of technologies (Conole et al., 2008). Most students now grow up surrounded by a technologically-mediated world and use a variety of technologies to problem solve. This has profound implications for education, and presents educators with both opportunities and challenges. Some of the challenges in creating this virtual national park have been
the time required to plan and create a coherent story, changing the role of the teacher from scholar to facilitator, making available a variety of resources for students to use in problem solving, and taking into account the reality that some participants have difficulty in taking responsibility for the learning process and simply want the answers.

The first attempt to implement the virtual national park resulted in comments by students that it was an unsatisfactory learning experience. The complexity and interconnectedness of the story, the contextual resource material, and the need to use a different method of teaching were key factors leading to these comments. These issues might have been overcome if it were possible to trial the role-play before going live and/or by having IT supporting advice to help address problems as they arose. However, overall the evaluation shows changes in use of technology must be accompanied by changes in how teachers approach teaching. Jonassen and Land (1999) outline the importance of ensuring that there is ownership of the inquiry process by students, coaching and modelling of thinking skills, opportunities for reflection, and collaborative approaches in role-plays. More generally, Biggs (1999) suggests that one key element in designing appropriate learning opportunities for the students is to get them to a point where they can successfully undertake assessment tasks. Clearly the use of digital environments in geographical education is not just about using technology so that students can have experiences that cannot be readily replicated in the classroom, but it is also about enabling students to be able to use this technology and interact with this technology so that learning occurs.

Role-playing can be unfamiliar to students. Students must unlearn the notion that knowledge can be provided only through instruction and lectures. This can mean they may feel lost and experience insecurity because there is less formality and control, as well as no clear answers to problems. Difficulties may arise when students are unable to accept a situation of greater student involvement and teacher passivity (Maltby & Mackie, 2009). Teachers must therefore be aware of
these potential difficulties and one way this role-play has attempted to overcome it is to put greater emphasis on group discussion, and using podcasts from actual workplaces.

As a final point, the meaning of work and career has undergone significant revision and reformulation within the career development literature (Blustein, 2006). Biggs (2003) suggests that employment and professions are changing rapidly, so it no longer makes sense to attempt teaching students all the things they will need to know about a specific career. Moreover unlike careers in nursing or teacher education, careers in geography and environmental management are often undefined. A contemporary approach to ensure students graduate with generic workplace skills such as how to solve complex and wicked problems in conservation management, requires a teaching environment that captures the complexity of the current world of work. A role-play such as this complemented with an appropriate amount of professional practice, may combine to ensure graduates have a core set of competences and meet employers expectations about handling complex tasks under a variety of situations.

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<table>
<thead>
<tr>
<th>The Degree</th>
<th>Environmental Management</th>
<th>Parks and Heritage</th>
<th>Ecotourism</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Scenario</td>
<td>Students are managers of a Catchment Management Authority</td>
<td>Students are managers of a Park that is has both natural areas and some formal open space</td>
<td>Students run an ecotourism resort set on the beach and surrounded by a national park</td>
</tr>
</tbody>
</table>

**The Curriculum**

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Develop a vision and business principles based on a mission statement provided within the particular scenario</th>
</tr>
</thead>
</table>
| Task 2: Human resources | Use a limited budget to:  
1. Create an organisational structure consistent with Task 1  
2. Identify complementary resources/ assets that will be outsourced  
3. Write a duty statement and a set of interview questions for a senior staff position within that structure |

| Task 3: Assess management |  
1. From an asset database provided develop a set of prioritisation principles to rehabilitate a number of rivers in various states of degradation  
2. From a database consisting of visitors using these rivers predict which rivers will need additional boat ramps  
1. From an asset database provided develop a set of prioritisation principles to repair a number of walking tracks in various states of degradation  
2. From a database of consisting of visitors using these tracks predict which tracks will need upgrading  
1. From an asset database provided develop a set of prioritisation principles replaces a number of visitor in various states of degradation  
2. From a database of consisting of visitors to the facilities at the resort predict which will need upgrading |

| Task 4: Resource management |  
Given resources to undertake a large scale landcare project:  
1. Develop a specific budget  
2. Identify the risks associated with this project  
3. Having received the funds develop a Gantt chart for its implementation  
Given resources to undertake a large scale project to protect a karst system:  
1. Develop a specific budget  
2. Identify the risks associated with this project  
3. Having received the funds develop a Gantt chart for its implementation  
Given resources to build visitor facilities around a karst system:  
1. Develop a specific budget  
2. Identify the risks associated with this project  
3. Having received the funds develop a Gantt chart for its implementation |

| Task 5: Policy and Ethics |  
1. Write a policy for the authority on public participation in planning  
2. From the records of a meeting of the board identify possible conflicts of interest by these board members  
3. Write a policy for the agency on environmental education and interpretation  
4. From the records of a meeting of the board identify possible conflicts of interest by these board members  
5. Write a policy on the resort being involved in commercial partnerships  
6. From the records of a meeting of the board identify possible conflicts of interest by these board members |
Figure 1: Student responses to a quantitative survey of eleven questions (role-play started in 2006)
Table 2: Students’ comments about what they thought was good or bad about the subject

<table>
<thead>
<tr>
<th>Year</th>
<th>Typical Comments</th>
</tr>
</thead>
</table>
| 2005 | “Overall the subject increased my understanding of the administration side of the industry”  
“I feel the subject has not helped me. Make the tasks more relevant to everyone.”  
“I found the subject painfully vague. Whilst I did see the relevance, most was so tedious that emphasis had to be placed on simply putting something on paper.”  
“A lot of topics I covered in High School particularly Business studies. I feel the subject has not increased my understanding of how natural resource management organisations run”. |
| 2006 | “I liked that it was a series of tasks I think that was a really good idea, but I am not sure what I learnt”.  
“Helped me learn how a uni subject should not be run”  
“Assessment task were confusing, modules were full of mistakes, and the lecturer difficult to contact and in some cases the response was not understood. The whole subject needs re-evaluation”. |
| 2007 | “This was a fairly tedious subject- but extremely relevant. The CD Rom was well designed and was helpful for every task. I think Jonathon has done the best he can in presenting a difficult subject”  
“I found it frustrating that hints and help were posted only a few days before the assignment was due”  
“I found that the majority of the assessment tasks are on areas I have not covered in other subjects- so perhaps more description of what was required and how it will be assessed is needed” |
| 2008 | “The modules and assessment provide areas of the workplace I did not think about so in terms of future knowledge with career I have a greater knowledge”  
“The structure of the assessment tasks was very effective- approaching each task with a clear focus and learning outcome made it clear what was required and how much time and effort to put in. The forum was most useful and queries answered efficiently most of the time. Discussing tasks as a group really cleared up some aspects and ensured I was on the right path” |