Reports of Practice

Incorporating Topics That Aren't Distance-Friendly Into an Online Program: One Development Team's Experience

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Abstract

The Native Species and Natural Processes certificate at the University of Victoria is an advanced-level online program of four courses to introduce students to state-of-the-art topics in the field of ecological restoration.

The program posed some unique challenges for course developers. The development team needed to find ways to create online courses that support a practical approach for topics that normally require tangible hands-on work.

The solutions to these challenges required a creative problem-solving approach to accommodate the unique elements of the development process and the delivery of each course. The solutions employed included (1) creation of a "connection to place" by use of extensive visuals in slide shows, (2) use of problem-based learning to develop critical thinking skills, (3) engagement of students via case studies to bridge the different languages inherent in different ecosystems, (4) conducting of virtual site visits to design real-world restoration projects, (5) inclusion of "fireside chat"

Résumé

Le certificat en Espèces indigènes et processus naturels (Native Species and Natural Processes) offert par l'Université de Victoria est un programme de quatre cours en ligne de niveau avancé ayant pour objectif de présenter aux étudiants des sujets de pointe du domaine de la restauration de milieux naturels.

Des défis très particuliers attendaient les concepteurs de ces cours. En effet, l'équipe de conception devait trouver des moyens de créer des cybercours offrant une approche axée sur le savoir-faire dans des domaines qui exigent habituellement des travaux pratiques concrets.

Pour remédier à ce problème il a fallu trouver de nouvelles façons d'intégrer les éléments particuliers du processus de conception à la prestation de chaque cours.

Les solutions adoptées comprennent : (1) la création d'un « sentiment d'appartenance à un lieu » en ajoutant un grand nombre de documents visuels dans les diaporamas, (2) le choix d'un apprentissage par résolution de problèmes, de façon à développer la capacité d'analyse, (3) la participation active des

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audio to reinforce the idea of multiple perspectives and uncertainty, (6) establishment of a community of practice to engage students in collaborative learning, (7) creation of assignments that involve scaffolding projects and peer review, (8) allowance for students to customize projects to accommodate their geography and different realities, and (9) development of a design charrette to practice collaborative decision making and design.

étudiants en leur soumettant des études de cas visant à rapprocher les différents langages liés à des écosystèmes différents, (4) des visites virtuelles de sites pour élaborer des projets de restauration sur le terrain, (5) l'inclusion de conversations informelles en format audio pour renforcer l'idée de perspectives multiples et d'incertitude, (6) la mise sur pied d'un Réseau de praticiens qui engage les étudiants dans un processus d'apprentissage coopératif, (7) la création d'un examen évalué par des pairs et l'élaboration de travaux comportant des projets s'échafaudant entre eux, (8) la permission accordée aux étudiants de personnaliser leurs projets en fonction de leur situation géographique et de leurs réalités, et (9) l'élaboration d'une charrette de conception pour s'exercer à la prise de décision et au design, en collaboration avec d'autres.

Introduction

The Division of Continuing Studies and the School of Environmental Studies at the University of Victoria developed the Native Species and Natural Processes (NSNP) Professional Specialization certificate to complement the existing Restoration of Natural Systems (RNS) program's certificate and diploma. The non-credit NSNP program targets working professionals who want to upgrade their skills and/or pursue professional development. The goal is to offer a multidisciplinary program that would appeal to students from a variety of regions and professional backgrounds related to ecological restoration.

The certificate is attractive to practitioners who work in restoration and related fields. They see "problems" with current practices and want to investigate advanced alternatives and innovative solutions. As well as advanced-level field techniques, this program also develops critical-thinking skills and asks challenging questions that require students to deal with the uncertainty inherent in problems in ecological restoration.

The NSNP program has five foundational areas of emphasis:

1. Taking a systems approach to restoration that focuses on ecosystem function as well as structure
2. Re-establishing natural processes to restore ecosystems
3. Conducting site analyses on the micro and macro levels that examine ecosystems at all scales
4. Using the latest theoretical constructs in formulating restoration plans
5. Addressing severely disturbed environments that provide their own unique challenges

Program Development

Prior to developing the curriculum, we did a needs analysis. This was done through discussions with representatives from the College of Applied Biology, the Association for Registered Professional Biologists of British Columbia, and the British Columbia Society of Landscape Architects. These associations require their members to participate in annual professional development activities so we anticipated that a number of their members would be interested in taking the proposed NSNP certificate.

The professional associations stressed the need for the program to be short (we decided on four courses), accessible (we decided on a distance format), and credentialed (we decided on the post-baccalaureate Professional Specialization Certificate). They identified an interest in a number of areas such as the use of appropriate plants in urban design, an ecosystems approach to planning and design, species at risk, invasive species, natural weed control, and low-impact development. Combining these interests and the foundational material they required we decided to develop the following courses:

- **Design Principles for Natural Processes** identifies natural processes involved in maintaining ecosystems and how they are recreated in restoration projects. It also addresses the element of design where a particular restoration project accommodates special requirements such as wildlife crossings.
- **Ecosystem Design Through Propagation of Native Plants** offers advanced instruction on ecosystem design that considers the reproductive biology of plants when restoring ecosystems. It examines the principles of native plant selection and propagation to meet site-specific design objectives.
- **Restoration Ecology** offers advanced instruction on the theory underlying ecological restoration that emphasizes unexpected connections that have significant implications. It is designed to broaden perspectives on ecological restoration and deepen the understanding of the way nature works.
- **Invasive Species and Novel Ecosystems** includes new paradigms and takes a broad approach to the topics, covering ecological, social, and economic aspects of invasive species, challenging existing concepts, and exploring the new concept of novel ecosystems.

Course Development

Courses were developed on a one-course/one-year schedule, with each course initially offered in a face-to-face version as a beta test for the curriculum. Lessons learned and student input from the face-to-face version helped to shape the distance offering. We made a distinction between an online course that would involve students engaging with the instructor and each other versus a correspondence course where students would just receive material and send back assignments. The courses were designed to have students benefit from feedback as they solved problems and constructed restoration plans.

The cutting-edge topics, advances in the field, and highly sophisticated students posed some challenging development needs. There were requirements for expertise in the areas of course content, pedagogy, and distance education. The course material was at a high level on a niche topic with a sophisticated audience. As a result, course development needed a team approach. The areas of expertise of the four team members and how they related to course development are shown in Figure 1. Each course took 8 to 12 months to develop.

Content Expert	Academic Administrator (Environmental Studies)	Program Coordinator (Continuing Studies)	Online Course Developer / Instructional Designer
Subject-Specific Expertise			
Broad Field Expertise—Resource / Topics			
	Program Lens (where course fits with the overall curriculum)		
	Knowledge of Program, Students		
		Project Management + UVic Systems Expertise	
		Adult Education Expertise	
		Program / Curriculum Development Expertise	
			Distance Education Expertise

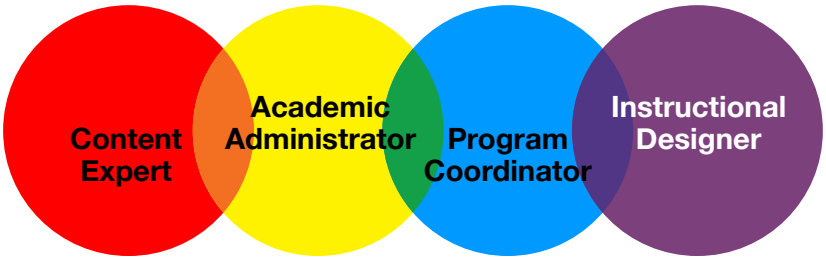

Figure 1: Course Development Team, Their Areas of Expertise, and Areas Where They Overlap

There was some overlap in the roles of the team members, but they brought distinct lenses that provided a "greater than the sum of the parts" approach. The content experts ranged from someone with no background in educational design/principles to others with an active interest in learning more about pedagogy, online learning, and curriculum. There were many meetings to develop the modules, each with their topics, unit outcomes, readings, Moodle content, assignments, and notes. It was a challenge to help the content experts understand the scope involved in preparing an online distance course. However, once the course blueprint neared completion each instructor had an "aha" moment.

Three of the four instructors in the NSNP program each had over 20 years experience in the field. All four came with existing material for PowerPoint and content; this provided significant savings for the development costs of the courses.

In keeping with the focus on advanced instruction, course content focused on making unusual connections that required (1) specific knowledge and lateral thinking skills, (2) difficult projects with conflicting priorities requiring problem solving skills, and (3) situations that required managing complexity and uncertainty. The latter draws on the four-quadrant model of holistic ecological restoration that addresses the interaction of subjective and objective perspectives in terms of personal values, cultural values, ecological values, and socio-economic values (Clewell and Aronson, 2007).

The Distance Challenge

Some of the challenges we faced were specific to our subject of ecological restoration (e.g., fieldwork) while others were the same challenges as any online development of an existing face-to-face course/program, although perhaps amplified in the NSNP program (e.g., collaboration of a geographically dispersed learner group). Teaching ecological restoration has a pedagogical approach that traditionally involves field trips and extensive dialogue in natural history.

Teaching taxonomy and natural history as we do in the Restoration of Natural Systems diploma program, taught at the third and fourth undergraduate years, is more distance-friendly. For example, two of the courses in the RNS program, Biodiversity and Conservation Biology, and Ethical, Legal and Policy Aspects of Ecological Restoration, are more straightforward than our NSNP courses. They lend themselves well to online distance education with a stronger focus on new vocabulary and concepts.

Teaching our more advanced concepts in the NSNP program is more difficult in an online environment because in it we also cover new vocabulary and basic concepts, but our focus is more on critical thinking and problem solving. For example, the NSNP program teaches how to address uncertainty due to gaps in data and directly engages with the strong subjective component of many restoration projects—the hidden curriculum of eco-philosophy and personal belief systems (e.g., religious orientation). These require the critical thinking that typically would occur through dialogue and debate in a classroom led by an instructor.

In addition to dealing with subjectivity, there is the problem of teaching applied skills and providing opportunities for hands-on practice. In this way some aspects of the NSNP program are comparable to the online delivery of lab-based science courses/programs (Jeschofnig and Jeschofnig 2011). For example, connection to place and site analyses are in some ways comparable to teaching anatomy and physiology. Lab-based science courses address this problem by sometimes requiring students to go to a well-equipped lab one day a week at an educational institution with an instructor and/or purchase LabPaqs, options not available for the NSNP program. However, as we do with NSNP, online lab-based science courses/programs sometimes cultivate an online community of practice through forums and peer review of assignments. Online Biology courses may also include a capstone field-based assignment.

Program Challenges and Solutions

Following are some specific program challenges we encountered and descriptions of the ways we overcame them.

Challenge: In an online course, how can we create a connection to place?

Solution: Slideshows to visually represent content, cases, etc. A series of PowerPoint "slide shows" accompanied by voice over and written text enabled students to enter into the world of restoration and share a common vision of an ecosystem, however geographically dispersed the students were. This required approaching topics in different ways. We used extensive visual representations (slides, videos) drawn from work with local/provincial/federal governments, consultants, and our own practice in the field.

Challenge: How can we develop critical thinking skills?

Solution: Problem-based learning. For example: In the course Restoration Ecology, Assignment 1, "Where Have All the Flowers & Birds Gone?", asks students to demonstrate prey suppression and trophic cascades using the issue of urban deer browsing on wildflowers in protected areas (Figure 2). Problem-based learning (PBL) is an instructional method in which students learn both content and thinking strategies through facilitated problem-solving exercises (Barrows 1996). There is evidence that PBL results in greater learning than traditional lectures (Barrett, 2010; Wells et al., 2009). Problem-based learning originated in medicine where it is effective in training physicians (Albanese and Mitchell, 1993). Similarities between restoration ecology and medicine (Schaefer, 2006) make PBL an effective approach to teaching restoration ecology as well.

Figure 2: Restoration projects in cities may increase deer populations or alternatively deer may be attracted to restored areas and graze on the plants. Resolving these conflicts requires applying critical-thinking skills (Photo by Anny Schaefer)

Challenge: How can we bridge the different languages inherent in familiarity with different ecosystems?

Solution: Case studies can be used to illustrate different vocabularies involved in describing different ecosystems and the approaches to ecological restoration in each. For example, in the case study of Macauley Point in the Design Principles for Natural Processes course, the goals focus on how to protect species at risk in this Garry oak ecosystem while simultaneously accommodating a social context for a space and trying to sustain a coastal bluff ecosystem. In the Invasive Species and Novel Ecosystems course students discussed case studies of novel ecosystems such as the Florida Everglades and Hawaii (Hobbs et al., 2006).

Challenge: How can we help students learn to conduct onsite analyses when they aren't onsite?

Solution: The Looking for Clues exercise on the decommissioning of the Heber Dam (Figure 3) was an assignment in which photos were used to take students "inside" a restoration project that had occurred. They were required to both assess the site and make recommendations for restoration. After they had completed this task, the instructor provided information about the design that he had used for this real-world restoration project, and discussion then ensued over the approach taken.

Figure 3: Sample slide from the Heber Dam case study providing an image of the site and statement of goals (Photo by Dave Polster)

Challenge: How can we reinforce the idea of multiple perspectives and uncertainty?

Solution: Provide topical conversations between experts in the field in a setting such as a fireside chat, also known as a debate, on the difference between ecological restoration and mine reclamation. An audiotaped debate between the course developer and an academic administrator over the differences between and merits of restoration and reclamation became the basis for an assignment in which students were asked to weigh in with their opinions on this topic.

Challenge: How can we engage the students in learning together and honour the expertise that they bring to the program?

Solution: Establish a community of practice in the course through an online forum and peer review of assignments. Communities of practice are formed by people working on a collective endeavour and provide a new model for doing things better. They consist of a domain (ecological restoration in this case), a community (here being students from government, academia, nonprofit groups, and the public), and the practice of tools, frameworks, methods, stories, and

activities related to learning (Wenger, McDermott, & Snyder, 2002). They connect people and in the process foster partnerships, enable dialogue, stimulate learning, capture existing knowledge, and generate new knowledge (Cambridge, Kaplan & Suter, 2012; Gray, Parker, Rutter, & Williams, 2010). They are a good approach for teaching ecological restoration. In the peer review of assignments, a student had his or her work critiqued by another student and revised the work according to the peer-review feedback before submitting the assignment to the instructor.

Challenge: How can we provide authentic, real-world learning in an online environment?

Solution: Assignments include scaffolded projects, where students build their final project from smaller assignments throughout the course, peer review, where students critique each other's project proposals, and in the Restoration Ecology course, an exercise called Show Me the Money. In Show Me the Money, students pitched their projects to the rest of the class for funding. The class is identified as the funding agency and has $50,000 to distribute. Each member of the class has a vote in deciding which project will be fully funded.

Figure 4: An example of fieldwork in the community, where a student restored a grassland for their course project with the help of his community members at a site damaged by construction when installing a water reservoir as part of a water upgrade in Princeton, British Columbia (Photo by Gordon Bibby)

Challenge: How can we customize learning when students are geographically dispersed and dealing with different realities?

Solution: Allow students to customize their final projects using local examples and skills they wish to develop. We encourage students to do projects that involve fieldwork in the community where they live (Figure 4). They are also encouraged to select topics that would in some way benefit their career (for example, a freshwater project if they hope to do freshwater restoration work), or a topic that represents their interest in a community group or a personal interest. This

enables them to invest time on a project of their choosing, within the scope of the course, and to potentially use their report for purposes beyond just obtaining course credit, such as taking it to a job interview as evidence of their report-writing skills.

Challenge: How can we convey the idea and provide practice with collaborative decision-making and design?

Solution (and an additional challenge): The design charrette is an exercise in which a specific design problem is presented and the solution is created within a specific time frame (e.g., Walker and Seymour, 2008). The solution could be in the form of words or drawings or a combination of both. The exercise is challenging in an asynchronous environment of online learning. However, students could be required to develop a restoration design on their own for three days and submit their designs to a forum. The instructor would then have one day to comment on each of the designs, after which the students would submit a final design of their own, based on what they have seen from other students in the course and the instructor's comments. An alternative approach is to use a charting exercise such as Lucidcharts, an app in Google Docs, or a mind-mapping program such as Coggle (coggle.it).

All of these approaches to teaching the NSNP program were intended to create a community of professionals who could work together and share opinions on the work that needed to be done and would provide for engagement and a sense of "being there," while allowing for distance education to take place.

Conclusion

We consulted with several professional organizations to explore the possibility of offering them professional development courses. We initially expected that we would offer short courses or workshops. It turned out that the organizations were satisfied that they were meeting the need for short courses and workshops through their annual conferences and in-house offerings. Instead, they looked to us to offer distance courses and to have the courses count toward a credential (NSNP certificate). At first we did not see how we could deliver on the expectation that we could teach courses that traditionally have a strong field component and active in-class discussions in an online environment.

However, we were able to make it work. We took advantage of an existing legacy of material and contacts from a related program (RNS diploma). We established a development team whose members complemented each other in expertise and who worked very well together. We also attracted four excellent content experts as dedicated instructors. Through extensive dialogue and some beta testing in a classroom situation we came up with nine approaches to instruction and assignments tailored for an online program that we believe help with incorporating topics that aren't distance-friendly.

Feedback from students was very positive. In the replies to the course surveys they almost all rated the courses as "excellent" for providing relevant skills and information and offering an effective learning experience. Metrics for clarity of requirements and content and the relevance and value of assignments were rated by at least 50% of the students as "excellent" and above average by the rest.

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Biographies

Val Schaefer is the academic administrator of the Restoration of Natural Systems program at the University of Victoria. He previously taught ecology and other biology courses at Douglas College for 27 years and was a founder of the Institute of Urban Ecology.

Val Schaefer est l'administrateur scolaire du programme de restauration des écosystèmes naturels (Restoration of Natural Systems) de l'Université de Victoria. Avant cela, il a enseigné l'écologie et d'autres matières au collège Douglas pendant 27 ans, en plus d'être l'un des fondateurs de l'Institute of Urban Ecology.

Sue Doner has been an online course developer/consultant with the Distance Education Services unit in Continuing Studies at the University of Victoria for 14 years. She works with content specialists to guide them through the process of developing and delivering online distance courses.

Sue Doner est conceptrice/conseillère de cybercours à l'Unité des services de formation à distance du Service des études permanentes de l'Université de Victoria depuis 14 ans. Elle guide les spécialistes de contenus dans le processus de conception et de présentation de cybercours à distance.

Janet Pivnick coordinates the Environmental and Sustainability programs in the Division of Continuing Studies at the University of Victoria. She holds a doctorate in philosophy of education and has been involved in non-formal environmental education initiatives in a variety of locations in Canada and the United States.

Janet Pivnick coordonne les programmes de formation en environnement et en développement durable du département des études permanentes à l'Université de Victoria. Elle détient un doctorat en philosophie de l'enseignement et s'est impliquée dans des projets en enseignement non conventionnel de l'environnement à différents endroits au Canada et aux États-Unis.