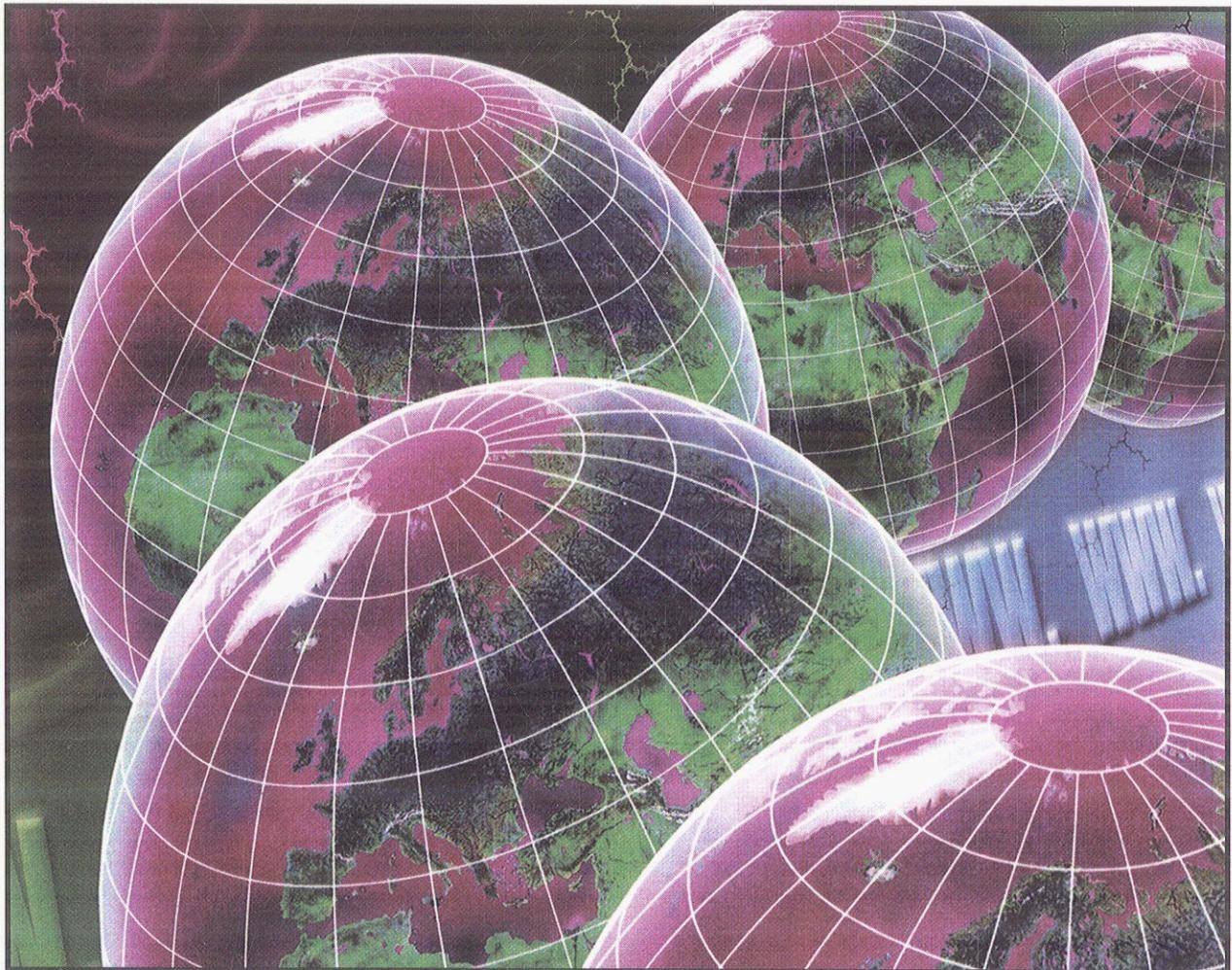# E-LEARNING FOR GEOGRAPHERS

Online Materials, Resources, and Repositories

Philip Rees, Louise Mackay, David Martin, & Helen Durham

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Section I
Collaboration in E-Learning Development

Philip Rees, University of Leeds, UK
Louise Mackay, University of Leeds, UK
David Martin, University of Southampton, UK
Gráinne Conole, The Open University, UK
Hugh Davis, University of Southampton, UK

Chapter I outlines the learning philosophies and learning strategies that inform the development of e-learning materials, focusing on a particular discipline context. The chapter authors come from a range of disciplines: geography, education, and computer science. Out of this inter-disciplinary collaboration has come new understanding of the range of approaches to learning (by the geographers) and new understanding of the enthusiasm of subject specialists (by the non-geographers).

Samuel Leung, University of Southampton, UK
David Martin, University of Southampton, UK
Richard Treves, University of Southampton, UK
Oliver Duke-Williams, University of Leeds, UK

In contrast to other Web-based resources, e-learning materials are not always exchangeable and share-able. Although transferring electronic documents between networked computers has become almost effortless, the materials may often require careful design and a great deal of adaptation before they can be reused in a meaningful manner. This process involves consideration of pedagogic issues such as course curricula, learning outcomes, and intended audience, as well as technological factors including

local institutional virtual learning environments (VLE) and any relevant learning technology standards. Chapter II illustrates how these issues have been addressed resulting in the successful exchange of e-learning resources at three levels: (1) at content level, where learning nuggets are created and packaged in a standards-compliant format to guarantee interoperability; (2) at the user level, whereby learners or tutors, rather than the resources, are transferred between VLEs; (3) at a higher system level, where the emerging Web Single Sign-On technology of federated access management is being used to enable truly cross-institutional authentication allowing learners to roam freely in different learning environments.

Section II
Geography Exemplars

Chapter III

Helen Durham, University of Leeds, UK
Katherine Arrell, University of Leeds, UK
David DiBiase, The Pennsylvania State University, USA

Collaborative learning activity design (CLAD) is a multi-institution approach to the creation of e-learning material from the design phase through the development stage and onto the embedding of learning activities into existing modules at higher education institutions on both sides of the Atlantic. This was the approach taken by a group of academic and e-learning material developers at the Pennsylvania State University and the University of Leeds to develop a series of learning activities to support the use and understanding of the global positioning system (GPS). Aided by concept mapping, a Guidance Toolkit and Web conferencing facilities, the group worked seamlessly at producing a series of e-learning resources, including the basics of turning on a GPS unit and obtaining a spatial location, GPS data properties and GPS components, differential correction, and sources of GPS error and error correction. Chapter III reflects on the success of this project.

Chapter IV

David Martin, University of Southampton, UK
Philip Rees, University of Leeds, UK
Helen Durham, University of Leeds, UK
Stephen A. Matthews, The Pennsylvania State University, USA

Chapter IV presents the development of a series of shared learning materials prepared to facilitate teaching in human geography. Our teaching exemplars include those designed to develop students' understanding of the data collection process, for example through the use of an online census questionnaire; analysis methods, through the provision of visualization tools to show demographic trends through time; and substantive examples, by comparison between urban social geographies in the USA and UK. Particular challenges are presented by the different nature (format, content, detail) and licensing arrangements for the census data available for student use in the UK and USA.

In Chapter V we outline the issues involved in developing, delivering, and evaluating a Level 2 undergraduate module in fluvial geomorphology. The central concept of the module was the use of online digital library resources, comprising both data and numerical models, to foster an appreciation of physical processes influencing the evolution of drainage basins. The aim of the module was to develop the learners' knowledge and understanding of drainage basin geomorphology, while simultaneously developing their abilities to (i) access spatial data resources and (ii) provide a focus for developing skills in scientific data analysis and modeling. The module adopts a global perspective, drawing on examples from around the world. We discuss the process of course and assessment design, our teaching experiences, involving a particular combination of "face-to-face" lectures and online sessions, complemented by independent online learning, and supported by the associated virtual learning environment. Finally, we discuss the issues highlighted by a comprehensive module evaluation.

There is an inherent antithesis between environmental management as professional practice and as concept or philosophy. In Chapter VI the undergraduate focus of a module on Upland Catchment Management and on environmental management is compared with e-learning for postgraduate delivery (a module on GIS for Environmental Management). The differing styles of delivery highlight the flexibility of e-learning as a vehicle for acquiring skills and knowledge, and underpin the claim that the result is an enhanced engagement with the practice of informed management.

In our experience of earth observation (EO) online learning we highlight the usefulness of the World Wide Web in terms of its software, functionality, and user accessibility for developing and delivering a range of activities and delivery modes to both undergraduate and advanced learners. Through the mechanism of developing teaching materials and adapting them for the online classroom, EO learning

can become highly interactive and well-illustrated by linking to online image processing software and relevant image data, make use of the Web's graphical interface to reinvigorate DOS-based remote sensing programs to be more student-friendly, and with the advent of collaborative Web software, such as Wiki, provide a networked community for EO learners. Chapter VII showcases a variety of delivery modes for our EO materials - online lectures delivered within a blended learning module for the undergraduate to individual online activities (remote sensing practical exercises and an electronic learning diary) for the advanced EO learner.

Chapter VIII

Helen Durham, University of Leeds, UK
Samuel Leung, University of Southampton, UK
David DiBiase, The Pennsylvania State University, USA

Academic integrity (AI) is of relevance across all academic disciplines, both from the perspective of the educator and the student. From the former perspective there is the need to increase the awareness of AI amongst the student population whilst monitoring and enforcing the rules and regulation regarding plagiarism within their institution. On the other hand, students need a full appreciation of the importance of AI and a clear recognition of the penalties for flouting the regulations in order to steer a successful passage through higher education and on into their professional career. By repurposing learning materials originally developed by the Pennsylvania State University (USA), the Universities of Southampton and Leeds (UK) have developed academic integrity guidelines to support students in their studies and provide an assessment of their understanding of AI concepts.Chapter VIII describes the development of these learning activities and examines the technical and content issues of repurposing materials for three different institutions.

Section III
Software Support for Learning Materials

Chapter IX

Karen Fill, KataliSys Ltd, UK
Gráinne Conole, The Open University, UK
Chris Bailey, University of Bristol, UK

The DialogPLUS Toolkit is a web-based application that guides the design of learning activities. Developed to support the project's geographers, it incorporates well-researched pedagogic taxonomies that are presented as drop-down lists with associated 'help' pages. Toolkit users are encouraged to consider and specify factors including learning and teaching approach, environment, aims and outcomes, assessment methods, learner and tutor roles and requisite skills as they design any number of tasks within a learning activity and select the tools and resources needed to undertake them. The output from the toolkit is a

design template that can then be used to guide the instantiation and implementation of online learning activities. The designs are saved within the toolkit, forming a database of designs, which other toolkit users can view. Chapter IX presents the rationale for the toolkit and the detailed taxonomies.

Chapter X

David DiBiase, The Pennsylvania State University, USA
Mark Gahegan, The University of Auckland, New Zealand

Chapter X investigates the problem of connecting advanced domain knowledge (from geography educators in this instance) with the strong pedagogic descriptions provided by colleagues from the University of Southampton, as described in Chapter IX, and then adding to this the learning materials that together comprise a learning object. Specifically, the chapter describes our efforts to enhance our open-source concept mapping tool (ConceptVista) with a variety of tools and methods that support the visualization, integration, packaging, and publishing of learning objects. We give examples of learning objects created from existing course materials, but enhanced with formal descriptions of both domain content and pedagogy. We explain how the resulting learning objects might be deployed within next-generation digital libraries that provide rich search languages to help educators locate useful learning objects from vast collections of learning materials.

Chapter XI

Terence R. Smith, University of California at Santa Barbara, USA
Marcia Lei Zeng, Kent State University, USA

Chapter XI describes a digital learning environment (DLE) organized around sets of concepts that represent a specific domain of knowledge. A prototype DLE developed by the Alexandria Project currently supports teaching at the University of California at Santa Barbara. Its distinguishing strength is an underlying abstract model of key aspects of any concept and its relationship to other concepts. Our strongly-structured model (SSM) of concepts is based on the viewpoint that scientific concepts and their interrelationships provide the most powerful level of granularity with which to support effective access and use of knowledge in DLE's. The DLE integrates various semantic tools facilitating the creation, merging, and use of heterogeneous learning materials from distributed sources, as well as their access in terms of our SSM of concepts by both instructors and students. Evidence indicates that undergraduate instructional activities are enhanced with the use of such integrated semantic tools.

Chapter XII

Richard Treves, University of Southampton, UK
David Martin, University of Southampton, UK

Teaching geography at university level involves students in study of complex diagrams and maps. These can be made easier to understand if split into parts. Chapter XII reports the work of a team writing a series

of courses in geographic information systems (GIS) and their solution to the problem, which involved authoring simple multimedia animations using Microsoft PowerPoint™ software. The animations were authored by those writing the courses with little input from the Web specialist supporting the team. The techniques that the team used to produce the animations are explained, as are the nine points of best practice that were developed and how the animations were used with other non-animated content. Three sub-categories of these animations are described and explained and the issues of maintenance and reuse of the animated content is considered.

Chapter XIII

Karen Fill, KataliSys Ltd, UK
Louise Mackay, University of Leeds, UK

Chapter XIII is concerned with the evaluation of learning materials and activities developed as part of the DialogPLUS project. A range of evaluation activities was undertaken, focusing on the experiences of students, teaching staff, and the entire project team. Student evaluations included both quantitative and qualitative approaches, particularly using a questionnaire design drawing on a specific methodology and generic quality criteria, facilitating comparative analysis of results. Discussion of the student evaluations is focused on specific taught modules from both human and physical geography. Results of these evaluations were discussed with teaching staff and contributed to improvements in the various online resources. Both internal and external evaluators were involved in interviewing key project staff and their different perspectives are presented. The chapter concludes by reflecting on the effectiveness and impact of different DialogPLUS activities, highlighting the principal impacts of the project as perceived by the students and staff involved.

Chapter XIV

Louise Mackay, University of Leeds, UK
David Martin, University of Southampton, UK
Philip Rees, University of Leeds, UK
Helen Durham, University of Leeds, UK

In this book we have illustrated the materials, software, and experience of developing and delivering geography e-learning courses and learning activities. In Chapter XIV we summarize how the teaching of a variety of geography topics has benefited from the following set of activities: creating media-rich online materials that take full advantage of linking to digital libraries; developing and adapting online, collaborative, and design software; and internationalizing materials through geography teachers in different countries working together. We take a moment to reflect on the experience of material development and the prospects for facilitating exchange of resources and student access. We provide advice to the aspiring geography e-tutor and describe how to access the wealth of materials that have been introduced in the preceding chapters. We then explain how the materials created will continue to be relevant beyond this book. We envisage that teachers, including ourselves, will download and then adapt the materials, borrowing content, techniques for presentation, or learning style. There will be an

ongoing process of teaching and review that incorporates tutor and student feedback. The material, its delivery, and its style will not remain static but we hope new developments will be shared via learning repositories. It is important to sustain good online resources. This can be achieved by readers updating the geography e-learning materials and depositing improved versions in the new UK academic learning material depository Jorum.

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Section IV
Additional Selected Readings

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Chapter XV

Sally J. Priest, University of Southampton, UK
Karen Fill, University of Southampton, UK

Chapter XV discusses the design, technical development, delivery, and evaluation of two online learning activities in environmental geography. A "blended" approach was adopted in order to best integrate the new materials within the existing unit. The primary aim of these online activities was to provide students with opportunities to develop and demonstrate valuable practical skills, while increasing their understanding of environmental management. A purpose-built system was created in order to overcome initial technological challenges. The online activities have already been delivered successfully to a large number of students over two academic years. Evaluation and staff reflection highlight the benefits and limitations of the new activities, and the chapter concludes with recommendations for others wishing to adopt a similar approach.

Chapter XVI

Dion Hoe-Lian Goh, Nanyang Technological University, Singapore
Yin-Leng Theng, Nanyang Technological University, Singapore
Jun Zhang, Nanyang Technological University, Singapore
Chew Hung Chang, Nanyang Technological University, Singapore
Kalyani Chatterjea, Nanyang Technological University, Singapore

Chapter XVI describes G-Portal, a DL of geospatial and georeferenced resources. G-Portal is designed to support collaborative learning among its users. This is achieved through personalized project spaces, in which individuals or groups gather and organize collections of resources drawn from the DL's holdings that are relevant to specific learning tasks. In addition, G-Portal provides facilities for classification and visualization of resources, spatial searching, annotations and resource sharing across projects.

Chapter XVII

Shivanand Balram, Simon Fraser University, Canada
Suzana Dragićević, Simon Fraser University, Canada

Chapter XVII describes the origins, boundaries, and structures of collaborative geographic information systems (CGIS). A working definition is proposed, together with a discussion about the subtle collaborative vs. cooperative distinction, and culminating in a philosophical description of the research area. The literatures on planning and policy analysis, decision support systems, and geographic information systems (GIS) and science (GIScience) are used to construct a historical footprint. The conceptual linkages between GIScience, public participation GIS (PPGIS), participatory GIS (PGIS), and CGIS are also outlined. The conclusion is that collaborative GIS is centrally positioned on a participation spectrum that ranges from the individual to the general public, and that an important goal is to use argumentation, deliberation, and maps to clearly structure and reconcile differences between representative interest groups. Hence, collaborative GIS must give consideration to integrating experts with the general public in synchronous and asynchronous space-time interactions. Collaborative GIS provides a theoretical and application foundation to conceptualize a distributive turn to planning, problem solving, and decision making.