Inverse Distance Learning: Digitally Enhancing a Geography Field-course

John Hasse and Chuck Colvard

Abstract
This paper explores the use of technological tools often utilized for traditional distance learning course delivery to provide a means of allowing virtual participation in a month-long geography field-course. Students participated in documenting the daily activities through digital photography and construction of a regularly updated course web page. Although the effort to create and maintain the inverse distance learning component of the course was substantial, many benefits were realized that enhanced the field-based and experiential objectives of the course such as enrichment of the experiential component for both real and virtual course participants, collaborative decision-making, and the acquisition of technological skills necessary for the rapidly changing field of geography.

Key Words: *field-courses, distance learning, information technologies*

John Hasse, Ph.D. is an Assistant Professor of Geography at Rowan University. Dr. Hasse's research interests focus on land use geography, urban sprawl environmental planning, smart growth, ecological building design, analytical methods of spatial science, impervious surface analysis, and geographic education.

Chuck Colvard is a Ph.D. candidate at Rutgers University and a research scientist with the New Jersey Department of Human Services. Mr. Colvard is currently using GIS to identify vulnerable populations and communities at risk in order to better provide them with needed social services.

Field-based education is particularly important for the discipline of geography. Geographic study is greatly benefited by in-field observation and experiential learning that only a field experience can provide. Geography education also is being dramatically changed by advances in technology and new mechanisms of communication. One area that has been affected most by changes in technology is the ability to reach students who cannot access the traditional campus-based classrooms. *Distance learning* (DL) is a label often given to the delivery of educational content to students located off-campus through mechanisms such as correspondence, video links, and, most recently, the Internet. This paper explores the potential for utilizing distance-learning technologies in a non-traditional manner. We have coined the term "inverse distance learning" for such technologies utilized within field-study in an effort to both enhance the learning experience of participating students as well as to provide a mechanism for virtual participation in the course by a community of colleagues, friends, and families following via the web.

Field-Courses in Geography

Field-courses have a long tradition in geography and many teachers regard fieldwork as central to geography education (e.g. Gold et al. 1991; Jenkins 1994; Kent et al. 1997). Research has shown that in-field experience stimulates curiosity (Salter and Meserve 1991); theoretical concepts are both better understood and longer retained through the hands-on experience provided by field study (Bain 1987; MacKenzie and White 1982).

Many educational objectives are sought from field-courses. Fuller *et al.*(2000) describe a number of the key educational objectives often intended from geographic study in the field (Table 1). The objectives are wide ranging, varying from acquisition of discrete analytical skills (such as reading specific instruments) to more vague benefits such as "lessening the barriers between staff and

Table 1. Key educational objectives addressed by geography fieldwork (from Fuller et al. 2000 based on Gold et al. 1991).

1.	Development of observational skills, enabling students to read and interpret the landscape
2.	Facilitation of experiential learning; learning is improved by experiencing reality
3.	Encouragement of student responsibility for their own learning, particularly where the fieldwork is project-based
4.	Development of analytical skills, particularly when technical skills are employed and collated data are analyzed
5.	Provision of a taste of 'Real' research, where the fieldwork follows points (3) and (4) above
6.	Kindling of a respect for the environment, especially where fieldwork is undertaken in remote areas
7.	Development of personal skills, where the fieldwork is group based, students learn to work closely with others and act responsibly
8.	Lessening of barriers between staff and students on residential courses-students come to trust us, and more readily take part in other learning experiences and so learn more effectively

students on residential courses" (Fuller *et al.* 2000). The intended objectives and benefits of field study in geography education are non-exclusive. Students gain many benefits on multiple levels directly related to geographic education, as well as those related to the overall personal development and maturation of the individual student.

While the benefits of geography field study may still need to be adequately proven by empirical analysis (Kent *et al.* 1997), it is a broadly accepted convention among many geographers that field study and field-courses in geography education are of invaluable benefit (Fuller *et al.* 2000). This belief in the benefit of field-courses continues in spite of the considerable effort and difficulties in actualizing a successful course. The expense of conducting a field-course (transportation, lodging, food, and other associated costs) as well as the health, safety, and liability issues give considerable challenge. In addition there are more subtle issues of personality conflicts, approaches to disciplinary problems, and the "emotional safety of fieldtrip participants" (Nairn *et al.* 2000).

In spite of the many difficulties involved with organizing and actualizing field-courses, many departments continue to offer courses as part of the geography curriculum. While the majority of these courses are offered as senior level capstone courses, others are offered as extensive summer field-courses to first and second year students in order to create a bonding experience and a means of recruiting and retaining new geography students (Lewis and Patton 1994).

Distance Learning in Geography

Distance learning (DL), also referred to as *distance education*, is a means of delivering the educational process through a non-face to face and potentially non-synchronous environment. Distance learning has a century long tradition, beginning as correspondence courses offered by institutions to non-traditional students unable to attend traditional classrooms. Over the decades DL has evolved to take advantage of the technological advances in communication—including video broadcasts, satellite conferencing, and highly interactive Internet-based learning environments (Moore and Kearsley 1996; Homan 1997). The increase in telecommunication capabilities has led to an increase in the quality of interaction available for DL education (Motiwalla and Tello 2000). Enrollment in credit-granting distance learning courses in accredited institutions increased dramatically throughout the 1990s (Lewis *et al.* 1999). The past decade also has witnessed a shift in the pedagogical approach related to shifting technologies for DL. The interactive and multimedia capabilities of internet-based DL have shifted the focus from the instructor-centered video lecture to the learner-centered interactive approach to education (Passerini and Granger 2000).

As distance learning transforms the teaching paradigm, a number of costs and criticisms have risen in the discourse. Delivering DL often is time intensive, requiring substantial technical capabilities far beyond the traditional expectations of faculty. Some are alarmed at the implications of DL for maintaining the integrity of the academic institution, warning that the push to technify the educational experience is masking the underlying "commercialization" of higher education and warning that the true benefits of instructional technology is yet unproven (Grineski 1999; Noble 2000). Despite the limitations and the potentially damaging effect on traditionally practiced methods of higher education, the demonstrable benefits and innovative potentials of DL are arguably in their infancy. Distance learning unquestionably provides increased accessibility to higher education, increased efficiency of communication, increased flexibility in the means and time of delivering education, and new potentials for students and teacher to virtually interact with each other in ways inconceivable in previous eras. For better or worse, the new technological capabilities are forever changing the learning environment (Butler 1998). Passerini and Granger (2000, 4) discuss the paradigm shift occurring for distance education:

> Rather than being an obstacle to interaction, "distance" becomes the seed of interactions among participants with diverse backgrounds and experiences, and facilitates the realization of other learning models born within the constructivist approach, such as socio-cultural learning. Classrooms become boundary-less both geographically … and content-wise.

As the capabilities of the Internet have altered the delivery of distance education, two approaches to the availability of the content can be identified. In many institutions the delivery of course content via programs such as Web CT allows access to only registered participants of the course. Other institutions such as MIT provide open access of course materials making the information available to the wider public. As technology makes it easier to make the classroom "boundary-less" the commodification of educational technology (in courseware) and issues of institutional control may potentially re-impose boundaries that may restrict the benefits of technology use. The appropriate use of technologies and the public accessibility of a course are important considerations when designing a course that incorporates DL technologies.

Digitally Enhancing a Geography Field-Course

Few can argue that the technologies of distance learning are shifting the delivery of geographic education. The potential benefits of distance learning and associated technologies are not only for students unable to attend traditional courses due to their physical distance or inability to travel, but DL also holds promise to bridge the gap in *pedagogical distance,* that is, separation of students from quality instructor interaction due to factors such as large class size (Reeve *et al.* 2000). Many applications of the DL technologies are being incorporated as part of traditional on-cam-

pus courses with indications of positive benefit (Abbey 2000). On-line courseware products such as WebCT and Blackboard provide enhanced means of communication between instructors and students as well as between students. The tools of distance learning may prove to have dividends in many non-conventional applications.

One such application is the use of DL technologies to enhance geography field-courses. This turns the traditional use of DL technologies around from delivering educational content of the classroom to students located afar, to a use of DL technologies that allows students to share their educational experience from a field-course with the university community back home. Such use of DL technologies can be conceptualized as "inverse distance learning" (IDL), learning that supports and enhances the educational experience occurring in the field. This inverse approach to distance learning technologies was incorporated into a summer field-course taught in the Rutgers University department of geography that focused on public lands in the American West. This course was offered during two consecutive summers.

Description of Public Lands of the American West

The logistics of the course were challenging, given the unusual format. Considerable planning and preparation were required of both the instructors and the students. Two months prior to the start of the course, there was an initial meeting to introduce students to each other, discuss the course format, discuss required personal gear (proper clothing, sleeping bags, packs) answer questions, and to assign readings and projects. Each student had the option of working independently or with a partner to profile the physical geography, human history, and current management issues confronting federal resource managers at one of the fieldtrip destinations. Typically the chosen subject was a national park with some national forests and wilderness areas included. Students were required to make a 20 to 30 minute presentation, with handouts, upon reaching their area of interest. Additionally, each student chose an animal (e.g., elk, moose, black bear) to describe in a brief report and presentation that would be delivered in the event of a field sighting or upon the discovery of tracks, scat, or other sign.

The actual classroom phase of the course began in late May with an introduction to the American environmental movement that briefly surveyed some of the writings of Thoreau, Muir, Leopold, and other well-known voices of conservation. This introduction was followed by an overview of the various federal agencies that oversee public lands and some of the environmental organizations that influence public policy. Students were encouraged to contact resource managers in advance of the trip to investigate some of the more difficult and contentious management issues confronting federal agencies entrusted with the stewardship of public lands.

Another class meeting focused on physical geography basics and highlighted some of the more compelling geological features of destinations on the itinerary. Discussions and slides of features such as Death Valley's massive graben, Yosemite's glacier-carved hanging valleys, and Yellowstone's varied geothermal features all

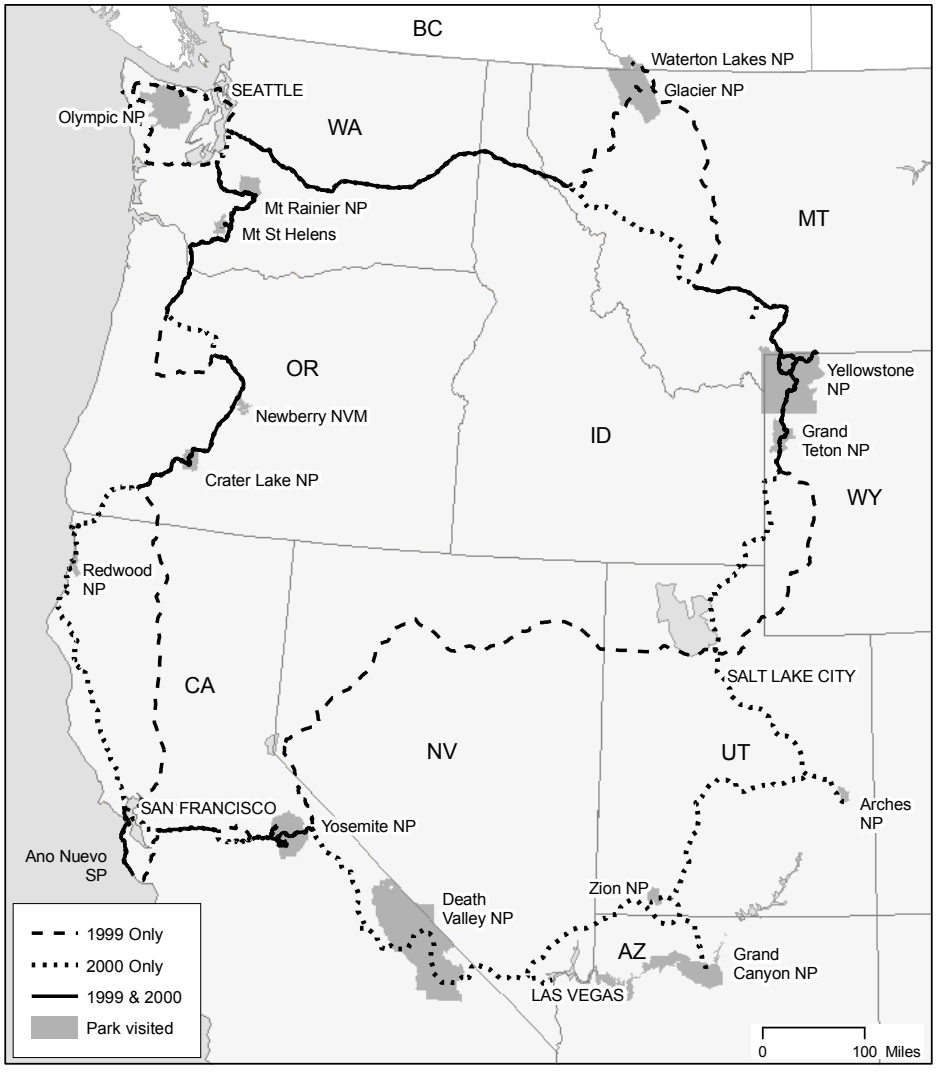

Figure 1. The Geography of Public Lands field-course routes taken in 1999 and 2000.

served to enthuse and engage students in preparation for the field-based learning experience. Finally, students were instructed in the basics of web design so that their preliminary reports could be posted online, prior to departure.

The two road routes varied (Fig. 1), but both began with a flight from Rutgers University to Salt Lake City where two instructors and ten students transferred to a tightly packed 15 passenger van. On the first summer trip, the group headed due west across the Great Basin to Yosemite, eventually journeying on to Crater Lake, Mt. St. Helens, Mt. Rainier, the Olympic Peninsula, Glacier National Park, Yellowstone, and Grand Teton with a few more notable stops along the way. The group returned approximately four weeks later to Salt Lake City for the flight home. On the second trip, student input led to the choice of a more southwestern itinerary, with stays in Arches, Zion, and Death Valley National Parks. During both trips, the group made stops at hostels in San Francisco and Seattle to grocery shop, do laundry, and to allow students to have unstructured time to keep group morale high.

A typical day in the field might include a stop at a park visitor's center, a talk with a resource manager, a long hike, and a student or instructor presentation. Each student was required to make a 20-30 minute presentation about one of the major destinations of the trip such as a national park. Usually the students presented in a dramatic setting, such as the North Rim of the Grand Canyon pictured here, which provided vivid illustration to the geographic topics covered in the presentation (Fig. 2).

The group camped almost exclusively, choosing sites within parks or national forests in close vicinity. Cooking and camp chores were shared between both students and instructors. Toward the end of the day, students downloaded digital camera images, viewed videotape, and recounted the day's events.

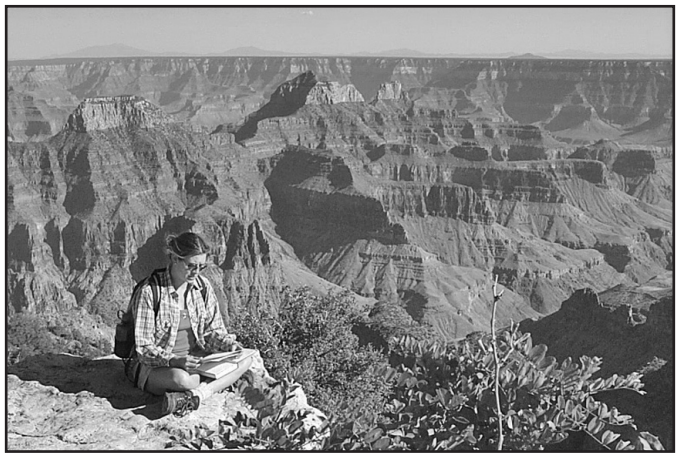

Figure 2. Student presentation at the North Rim of the Grand Canyon.

Inverse Distance Learning, Exploration, and Public Lands

The inverse distance-learning concept has its roots in exploration. The earliest traditions of geography incorporated field sketches of landscapes to describe and communicate analyses of place. By the middle of the nineteenth century, painters and photographers became essential members of expeditions inventorying the American West. In 1870, U.S. Department of the Interior officials instructed Ferdinand Hayden to include full visual documentation of the landscape, with sketches, paintings, and photographs in his survey of what would later become Yellowstone National Park (Kinsey 1992). Balm (2002) points out that Thomas Moran's (Hayden's chosen artist) paintings were essential to the eventual commodification and government acquisition of lands in the American West. Further, the idea of a national park itself is credited to an earlier painter of the American West, George Caitlin (Nash 1990).

Photography quickly became a foundational tool of geographic communication, exemplified by a century of *National Geographic Magazine*. In recent years digital

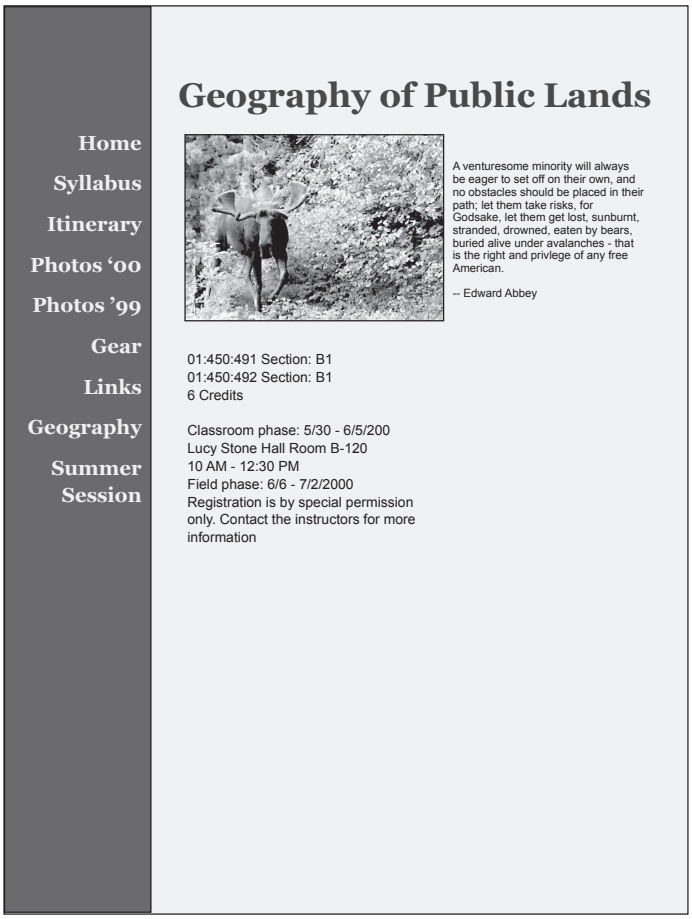

Figure 3. Home page of the Public Lands field-course which provided virtual participation of an extended community with the field-course experience of the participants.

photographic technology has added a new dimension to the tradition of geographic photographic documentation. Digital images are easily incorporated into computer applications and available for presentation and other uses. Digital imagery also is easily incorporated into web pages and transmitted via the Internet.

More recently, geographic exploration has been brought into the age of the Internet with high profile applications such as virtual tours of a rain forest, virtual exploration of Antarctica, Google Earth digital globe, and even exploration of Mars by recent rovers. Application of distance technologies need not be exclusive to large, well endowed institutions, but are well within the reach of most college programs providing a means for students to participate from afar.

Photo-documentation was one of the foundational components employed by the authors for the IDL field-course. Physical landscape features, geology, climatic regions, public lands management (a central theme of the course), and cultural landscapes were captured by more than two thousand photographs taken by instructors and student participants during the month long field-course. Many hours of video documented landscapes, student presentations, chance encounters with wildlife as well as moments of fun such as sliding down the glaciers flanking Mt. Rainier and bathing in chilly mountain streams.

Figure 4. Students collaborating on the daily course web page content.

Each day (often while traveling in the van) the photos of the previous day were archived from the digital cameras to a laptop. A selection of the best or most representational photos were developed into a photo journal web page and linked to the course home page (Fig. 3). Students would all participate in development of the photo-journal from deciding which photos to include to writing appropriate captions for each photo (Fig. 4). The photo-journal web page was an intentionally designed component of the initial course held during the 2003 field season. However, the influence of the web page of the participants experience was an unforeseen positive outcome the first year.

The participants and instructors worked on developing the digital content on a daily basis usually after dinner or during travel periods in between destinations. The content was uploaded approximately every three days or less depending on access to an Internet connection, usually in copy centers, coffee shops, and hotels. As the daily web-based photo-journal began to be uploaded to the Rutgers University's geography Web site, the course webpage rapidly grew in popularity within the community. Soon the Rutgers' geography department, friends, and family members were following the field trip with only a day or two lag from the actual occurrence of the events. Telephone calls from family members and e-mail from university members conveyed the sense of virtual participation. The Web site became a popular daily visit to follow the progress of the course and the experiences of course participants.

It became evident the first year that the course was offered that the virtual participation of fellow students, friends, and family through the Web site added a substantial reinforcing element to the educational experience of those enrolled in the course. Participating students' project presentations (a compilation of their research) along with their daily photo-journal were accessible on the Web site. Students, in essence, became teachers of their own research topic area, not only to classmates on the trip but to the larger community following along via the website. The tools of distance learning were *inversed* to benefit the community back home following the students in the field. The expanded educational experience evoked by the virtual participation of people beyond the course participants is the essences of "inverse distance learning."

Discussion

The incorporation of digital technologies into this geography field-course and the development of the inverse distance atmosphere demonstrated a number of benefits directly related to Fuller's (et al. 2000) fieldwork objectives.

1. The need to create a daily photo-journal web page helped focus students' attention on what they were observing and to think about the best means for capturing the significant features and processes of the landscape for the most effective communication via the web (Fig. 5).

Figure 5. The emphasis on digital photo-documentation of the course helped to focus the students' attention on significant physical features and processes of the landscape.

2. The experiential learning of students on the trip was enhanced by the excitement of sharing nearly real-time experiences with the community via the web. Also, virtual participants gained a measure of field-course experience from the comfort of their own computer terminals.
3. Students gained a measure of added responsibility for their own learning by conveying educational concepts in a successful manner through an effective and understandable representation on the course web page.
4. Technical and analytical skills were enhanced because students learned techniques of landscape documentation, digital photography, web page design, and Internet transfer of data. In the twenty-first century, these are important skills for geographers of any sub-discipline.
5. Systematic photo documentation of daily events, landscape features, and processes provided 'real' geography research to the students.
6. The challenge to take dramatic photos for the daily Web page helped students calibrate an eye for experiencing and capturing the beauty of the natural world.
7. The creation of a daily Web page required development of personal skills to work responsibly together in producing a collaborative field course project.
8. In a typical field-course setting, the close and extended period of time spent together naturally results in a deeper familiarity between participants without the help of technologies.

However, the ability of the course to be shared with the entire faculty, staff, and other students back in the department lessened many of the barriers between people that often encumber the college experience for young adults. The unfolding adventure documented on the course web page resulted in student participants becoming well-known to many who may not have otherwise had an opportunity to become acquainted.

Documenting the field-course nearly real-time via the Web page provided a number of further benefits. Participating students seemed to be more engaged with the course and with each other because they had to integrate and organize the experience of each day in the photo-journal. Many discussions stemmed from deciding which images best summarized the important events and lessons of the day. Students learned an added degree of collaboration and the importance of working together to give input into each daily page. Collaborative decisions were made as to the most significant events to include in the photo-journal culled from the dozens of images taken each day. "Packaging" the daily events onto the web site for the virtual community provided an added sense of story, drama, and fun to the experience. Events were captured in words and pictures and shared while the excitement of the moment was fresh.

Evaluation

It is difficult to empirically determine the degree to which the distance learning technologies enhanced the educational experience of the course. Since the IDL techniques were developed on the fly during the first offering of the course, there was no opportunity for pre and post IDL evaluation. Student instructional rating forms (which are mandated to be completed by the students at the end of every course) focused solely on assessing the course content and the teaching effectiveness of the instructors, but provided little useful feedback on the importance or efficacy of the IDL aspects of the course. However, exit interviews and instructor self-assessment concluded that the outcome of the course was substantially augmented through the use of technology and the ability to communicate the course content via the Internet. The student interviews reflected that the enthusiasm of sharing the experience of the course via the internet enhanced the richness and retention of what the students learned.

The author's self-evaluation found that development of a nearly "live" course Web page and the IDL that occurred from it was a valuable pedagogical addition to the course. The substantial positive outcome warranted the significant efforts involved in incorporating the technology into course organization and operationalization. The technical complexity of compiling and downloading web pages every few days was reasonably manageable. Changes in technology and affordability of software increase the ease of creating Internet content in the field. Students are increasingly more comfortable with changing technologies that, in many cases, are the vehicle through which faculty

are exposed to innovations that might be incorporated within their curriculum. Many times the instructors asked the students how to technically accomplish the intended tasks providing the students further empowerment and ownership of the entire experience. The instructors conclude that the field-course was substantially more successful by incorporating IDL than if it were not utilized. However, a more empirical means of assessing the cost and benefit of IDL on a field-course is an area of much needed research. A more rigorous system of evaluation for future courses would likely entail evaluation questions specifically geared toward the value that the students placed on the IDL components—the benefits as well as the detractions. An online evaluation mechanism could also extend the feedback to the virtual participants. Ultimately, the IDL model developed in this paper represents an experimental draft. The concept is certain to evolve and improve in subsequent field course offerings.

The Future…

Quite a bit has changed since the most recent course offering. There have been many advances in technology that facilitate and simplify the production of IDL multimedia content. Cheaper digital video cameras and higher resolution digital cameras with longer lenses make better imagery available to a greater number of departments and students. High performance laptops with greater storage capacity and high-speed rapid FireWire interfaces have greatly enhanced the ability to edit and process digital video in the field. Further, there is now a small commercially available GPS unit that will attach to a windshield, plug into a laptop, and display a moving vehicle's real-time location on an included software roadmap. Finally, wireless networking and the proliferation of "hotspots" in airports and coffee shops have increased the potential number of upload points along the road facilitating a more timely update schedule.

The use of the internet also has evolved since the last offering of this course. Web Logs (blogs) and pod-casts have become widely utilized for documenting points of view and facilitating multi-media files for download. A similar course today would no doubt incorporate these and other advances to provide video reports and audio journals for the virtual participant to have a more engaging connection to the field trip and a deeper pedagogical experience.

Ironically, as the technologies available for IDL to enhance field geography have become better, easier, and cheaper, the possibilities for actual physical field trips have become more difficult. A report issued by the National Transportation Safety Board (2002) found that there is a higher risk of vehicle rollover associated with fully loaded 15-passenger vans. The report prompted many universities (including the sponsoring university) to prohibit the use of these vans on university sponsored trips or activities. In addition, recent state budget cuts have forced many universities to raise tuition and fees, pricing already costly enrichment courses beyond the reach of students of modest means. Concerns for liability and increased gasoline costs are further factors that have made the prospect of offering field courses more challenging. Just as capabilities for Inverse Distance Learning are maturing to provide virtual participation, the field course tradition in geography is in jeopardy of disappearing.

Nevertheless, the benefits of field courses warrant efforts to continue to offer them. The high visibility and novelty of an IDL enhanced field course may help provide the added leverage needed to elicit stronger support from the host institutions.

In spite of the challenges involved and impediments to offering field courses, we conclude that these efforts to digitally enhance a geography field-course are more than worthwhile due to the success of these pilot studies in engaging students and the wider university community to more effectively evoke understanding of the natural world, while fostering an interest in travel and an attitude of lifelong geographic learning.

Acknowledgements

The authors would like to express gratitude to the Rutgers Department of Geography, the Rutgers Summer School program, and numerous individuals who provided technical and organizational support for these courses. Special thanks go to Dave Robinson, Tom Kujawski and Carol Gold. The authors wish to thank Andrew Marcus and Mike Lewis who provided inspiration for this course and the anonymous reviewers who provided excellent suggestions. The instructors also thank all the student participants who made this field-course a successful and memorable event.

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