Objective Evaluation: A Search for Parity in an Online Geography Certificate Program

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Abstract: *Departmental decisions to continue an asynchronous, post-secondary distance education program, discontinue it, or "export" it to a continuing education department can be subject to subjective decision-making influenced by external factors such as pressure to increase student enrolment within a department or strong faculty opinions that distance education is the "wave of the future and we need to be riding the wave." This presentation outlines an evaluation of a departmental distance-education program. The program evaluation utilized several methods that strived to inject objectivity over subjectivity in evaluation and subsequent decision-making. A rapid multi-modal approach was taken that included evaluation methods of (1) surveying students/instructors regarding their perspectives of the online psychosocial learning environment, (2) content analyses comparing the online version of courses to face-to-face versions, (3) cost comparisons in online vs. face-to-face courses, (4) student outcomes, (5) student retention, and (6) benchmarking against other GIS certificate programs. The evaluation results are presented in terms of strengths, weaknesses, opportunities, and threats (SWOT)—borrowing from a model used less frequently in academia than in business—allowing departmental administrators and decision-making committees to make judgments informed by facts rather than being influenced as much by organizational dynamics of emotions, beliefs, and opinions.*

Introduction

Distance education has become a firmly entrenched part of the post-secondary landscape over the last decade. Networked digital communication has facilitated an explosive growth in this method of reaching learning populations to the point that the higher education trend to produce distance education units and programs has been characterized as a "land rush" (Molenda & Harris, 2001, p. 6) to get online. Molenda and Harris (2001) noted that 60 percent of all United States colleges and universities have Internet-based courses. However, when public four-year institutions were considered by themselves the figure increases to 90 percent offering distance education courses (National Center for Education Statistics, 2003). Meanwhile, the United States Army has over 30,000 soldier-students enrolled in its worldwide eArmyU program (Sample, 2004) with plans to increase enrolment to 80,000 by the end of 2005 (Lorenzo, 2002; Sample, 2004). At the same time, Australian universities are experiencing converging influences driving them "towards online, for profit education on a global scale" initiated by a "desperate need to improve income to compensate for the lack of public funding" (Gururajan, 2002, ¶ 2). This issue is of sufficient consequence that it prompted former Deakin University Vice-Chancellor, Malcolm Skilbeck, to pose the question "Does the university have a future?" (Skilbeck, 2001, p. 61).

While change is inevitable in higher education, regardless of the forces driving it, quality in education must remain high, lest universities lose their status as degree-granting bodies and become little more than market players in the global corporate/workplace milieu. Fifth-generation distance education, which is defined by the convergence of telecommunications and computing technologies available (Taylor, 2001), has come to a point where higher education chances falling prey to "the commoditization of the educational function of the university, transforming courses into courseware, the activity of instruction itself into commercially viable proprietary products that can be owned and bought and sold in the market" (Noble, 1998, ¶ 6; see also Wright, DiBiase, Pancake, Wright, & Foote, 2004). In consideration of this statement, universities must consider not only how distance education is presented in terms of its value in the market, but also in terms of its value to the learner (Morgan & McKenzie, 2003).

However, *value* in distance education is a difficult notion to pin down. Value, measured in some ways is only perception—perceptions of learners, perceptions of university administrators, and/or perceptions of faculty. Measured in other ways value can be linked to costs in dollars or some other currency. Regardless, university administrators understand that they are offering services of some value in a marketplace that is highly competitive (Rovai, 2003). Competitiveness is of particular concern in workforce-oriented, higher education online certificate programs that are not necessarily directly tied to an academic degree. Online certificate programs differ in terms of duration and focus (Wikle, 1999). They are shorter term, often workforce or skill oriented (Gaudet, Annulis, & Carr, 2003), and cater to a segment of the population that can be labeled as "non-traditional," thus they exist in a milieu unlike that of a traditional university degree programs. Online geographic information system (GIS) certificate programs typically fit into this category of post-secondary education that competes outside of the traditional higher education market on one level, yet within the traditional marketplace on yet another level if traditional students are taking classes for degree credit.

In order to ascertain value, thus increasing a program's competitive standing, any given distance education program must be evaluated at some level in order to identify and make improvements and assure success for the long term (Rovai, 2003). However, evaluation implies both measurement and judgment (Rovai, 2003). In order for university leaders to make informed judgments, they must develop and implement evaluation that is based on multiple forms of evidence gathering so that the convergence of the results of the measurements presents the truest picture of a program's value and effectiveness. Without input from multiple measurements distance education administrators are forced to rely upon their beliefs, or beliefs of others, rather than on less subjective data. Despite distance education being in its fifth generation, evaluation of distance education programs remains less than rigorous and relies on (a) student outcomes (achievement, grades, test scores), (b) attitudes of students and instructors, and (c) satisfaction of students and instructors captured through self-report instruments and subjective qualitative evaluation based in anecdote (Diaz &

Cartnal, 1999; Ehrmann, 1990; Harnar, Brown, & Mayall, 2000; Institute for Higher Education Policy [IHEP], 1999; Olsen, 2000; Rovai, 2003).

This paper presents a rapid, multi-modal evaluation of an online GIS certificate program in a four-year university. It offers views into the measurement phase of program evaluation designed to offer university administrators objective insight so they have opportunities to make sound judgements regarding program renewal.

Distance Education Program Evaluation Background

Program evaluation is conducted to answer questions and address issues raised by stakeholders (Rovai, 2003). Evaluation is a collection of techniques, proficiencies, and sensitivities required to establish (a) if a service is needed and liable to be used, (b) if it is conducted as it was planned, and (c) if it actually helps people (Posavac & Carey, 2002). Within this collection, program evaluation is most commonly used for (a) determining accountability and effectiveness, (b) identifying weaknesses so effectiveness can be improved, (c) gathering evidence of effectiveness to address questions of doubters, and (d) provide information for program renewal (Scriven, 1981). Still others suggest that in distance education programs, evaluation should focus on (a) the quality of students' learning in terms of course effectiveness, (b) the quantity of their learning through enrollment and course completion rates, (c) the status of the program in terms of course transfer equivalency and accreditation, (d) and the cost of learning in terms of cost effectiveness and cost benefit ratios (Keegan, 1996).

Despite the intended purpose of a distance education program evaluation there are six evaluation approaches that Worthen, Sanders, and Fitzpatrick (1997) have identified: (1) objectives-oriented, (2) consumer-oriented, (3) management-oriented, (4) expertise-oriented, (5) adversary-oriented, and (6) participant-oriented. *Objectives-oriented* evaluation is aimed at determining the extent to which educational objectives of a program have been met. Difficulties arise within this approach when objectives have been poorly defined, when unintended outcomes exist, and/or when there are unwritten/unspoken program objectives (ex. profit making, being the first to offer online courses). In educational environments students' scores are often used as the measurement benchmark for objectives-oriented evaluation, despite the point that the unit of analysis of an individual's grades can seldom be directly correlated with the larger unit of analysis of program objectives. This is true especially when an individual's grades are tied to student participation, late policies, and when instructor-made exams are used and noting that instructors are not likely to assign grades consistently across terms (Rovai, 2003). *Consumer-oriented* evaluation is summative in nature for projects with a definitive ending, thus is not appropriate for ongoing programs. This orientation also lacks consideration for differences in students' aptitudes, learning styles, and affective traits (Dille & Mezack, 1991;

Ehrman, 1990; Westbrook, 1997). *Management-oriented* evaluation is used primarily for university decision-makers to allocate funding. Problematic in this approach is that program evaluation conducted by those involved in the program tends to promote the status quo (Woolcot, 1997). *Expertise-oriented* evaluation is commonly implemented by university accreditation organizations whereby content experts take part in determining the value of curriculum. However, given the unique nature of distance education, if the expert is not familiar with distance education, s/he may look unfavorably on what is otherwise a well-developed program simply because it is different. *Adversary-oriented* evaluation of distance education incorporates some use of opposing evaluators aimed at instilling in them an appreciation of distance education. Likewise, skeptics' viewpoints, if addressed satisfactorily, can strengthen a program. Finally, *participant-oriented* evaluation is one that is qualitative in nature and involves all stakeholders. Stakeholders with more influence or stronger voices may skew outcomes if this approach is used exclusively.

While the above approaches make for neat categorization in the development of distance education program evaluation, it is atypical of any program evaluation to be derived exclusively from any single approach listed above. Most distance education approaches are multifaceted and have various purposes in mind. Recent literature that focuses exclusively on distance education *program evaluation*, as opposed to distance education *course evaluation*, offers evidence that there is little consensus on what should be evaluated and which approaches or strategies should be used. This has led some to call for standards in distance education. For example, Olson and Shershneva (2004) identified a variety of organizations that have attempted to define voluntary standards for distance education programs. Condensed, the standards they identified from five organizations fall into seven categories—standards for (1) course design and development, (2) program support and services, (3) student outcomes and achievement, (4) technology use, (5) satisfaction of students and faculty, (6) evaluation, (7) cost effectiveness. For purposes of comparison, Olson and Shershneva (2004) classified these seven general categories into five broad standards components and compared them across the five standards-setting organizations in terms of (1) student/learner standards, (2) curriculum standards, (3) faculty standards, (4) institutional context standards (i.e. consistency with institutional goals), and (5) departmental context standards (i.e. budgets reflect adequate funding).

Upon examination of published accounts of distance education program evaluation one can see the reason why voluntary standards might be helpful. In earlier generations of post-secondary distance education, when the "no significant difference" between asynchronous distance education and traditional classroom education was prominent, Dumont (1996) and Hiltz and Wellman (1997) reported that grades were the predominant measure of program effectiveness. One study of 56 distance education program evaluations (Verduin & Clark, 1991) demonstrated that the most prevalent measurement compared

grades of online students to those of face-to-face students. More recent program evaluations have expanded beyond simple student grade comparisons. For instance, Shea, Motiwalla, and Lewis (2001), looking at the broad perspectives of 68 distance education coordinators, used a non-validated, multi-scale survey instrument to determine characteristics of: (a) class size, (b) target populations, (c) media and technology used, (d) student characteristics, (e) program administration issues, (f) perspectives on distance education versus face-to-face classes, (g) student requirements, and (h) faculty requirements. Grabe and Sigler (2002) reported on their program evaluation in terms of the use of technology study tools in a distance education psychology class as measured through student grades on examinations plus a non-validated study-tool questionnaire, triangulated with results from the Inventory of Learning Processes (ILP).

Evaluation in Online Geographic Education

Distance education evaluation specific to post-secondary geographic education has been conducted in a variety of locations around the world. In South Africa Pretorius (2004) conducted a fundamental program evaluation measuring an online environmental management degree program in terms of student enrolment, the spatial distribution of students, student population demographics, and students' views on the relevance of the program by means of an non-validated questionnaire. In Norway, Lægran (2002) evaluated the "Geography on the Net" program by means of measuring student collaboration and communication.

Others involved in online geographic education have measured individual program components, yet their foci were narrow, typically on a class or on a strategy used in a class, and do not provide a larger picture of the effectives of entire programs of study. For example, using a non-validated survey instrument, Solem et al. (2003) measured students' perceptions of the value of a single module in a pilot geography course. They also measured students' perceptions of instructional procedures, technology, and positive and negative aspects of the class. Similarly, Harris (2003) measured classroom communication and learning community. In an online geographic information systems (GIS) class he measured the frequency of communication between students and between the students and the instructor when they used different online communication tools. He also qualitatively captured students' comments about the advantages and disadvantages of the differing communication tools. While these two examples do shed an important light on geographic-oriented distance education instruction, they do not offer insight on an entire program consisting of multiple online courses taught by multiple instructors.

So, the case in distance education program evaluation is one that could stand to be more informed by a reliable body of literature sufficient to guide the design and conducting of rigorous evaluation in the form of purposes, approaches, and strategies, yet predominantly ends up measuring only student achievement, comparing online classes to face-to-face classes, or uses low-rigor self-report

instruments that have not been validated or assessed for reliability. What is more, in online geographic education, and in online GIS certificate education in particular, there appears to be little progress in rigorous evaluation of programs. Chalmers et al. (2004, p. 1) noted that “much remains to be done to create, assess, and disseminate a set of rigorous online courses and programs by geography faculty, departments, and higher education institutions worldwide.”

A Rapid Multi-Modal Approach in Evaluating an Online GIS Certificate Program

The remainder of this paper presents an evaluation of an online GIS certificate program. The program consists of four asynchronous undergraduate-level geography courses, each equivalent to four semester hours. Course participants need not have a degree in order to take the course series, but the courses must be taken in sequence. Doctoral students who are content area experts in geographic information systems (GIS) teach the courses. In order to circumvent problems in expert-oriented program evaluation, whereby the “expert” is often a content expert, but not a distance education expert, an evaluator was selected who is familiar with the content—GIS and remote sensing—and has 10 years experience in post-secondary distance education instructional design and teaching, as well having the unique perspective of being a student of distance education.

The evaluation combines management-, expertise-, and participant-oriented approaches for the main purposes of (a) identifying weaknesses so effectiveness can be improved, (b) ensuring parity with face-to-face courses, and (c) providing information for program renewal—the purposes for which the program evaluation was requested. It used six strategies of:

1) Surveying students/instructors regarding their perspectives of the online psychosocial learning environment
2) Content analyses comparing the online version of courses to face-to-face versions
3) Basic cost comparisons in online vs. face-to-face courses
4) Aggregated academic outcomes
5) Student retention
6) Benchmarking against other GIS certificate programs

The evaluation results are presented by individual strategy below with “observations” noted. A summary in terms of strengths, weaknesses, opportunities, and threats (SWOT)—allowing departmental administrators and decision-making committees to make judgments informed by the data—is presented at the end. Judgment has been withheld, since this paper’s aim is to present measurement only, judgment being left to program administrators.

Methods and Results

Psychosocial Learning Environment Evaluation Component

The term learning environment carries with it a variety of meanings. It has been used to indicate a type of learning task (Tynjälä, 1999), to denote virtual spaces found in computer applications and on the Internet (Fulkerth, 2002; Gibbs, 1999), and to refer to the classroom psychosocial environment (Henderson, Fisher, & Fraser, 2000). In this paper the concept of environment refers exclusively to the psychosocial learning environment that, in his foremost work, Moos referred to as the “social climate” and “personality of the environment” (1979, p. vii).

Learning environments research, just over three decades old, is firmly established (Fraser, 1998a; Goh & Khine, 2002; Tobin & Fraser, 1998) among a variety of educational research and evaluation methods dominated by the assessment of students’ academic achievement (Fraser, 1998b). While quantitative measures of classroom effectiveness are often based on "narrow testable, standardized, superficial, and easily forgotten outcomes," other areas of higher education are less emphasized (Kyle, 1997, p. 851) and a complete image of the process of education is not formed within the research.

For this evaluation students in each of the online GIS classes were administered the *Distance Education Learning Environment Survey* (DELES). The DELES is a validated online survey (Walker, 2003; Walker & Fraser, submitted) measuring six scales of the asynchronous online environment: (1) Instructor Support, (2) Student Interaction and Collaboration, (3) Personal Relevance, (4) Authentic Learning, (5) Active Learning, and (6) Enjoyment (an affective-trait scale).

Two forms of the DELES were administered via an online survey. A Student Form was administered to students enrolled in the fall 2004 online GIS certificate courses. An Instructor Form of the DELES was administered to the two online instructors who each taught two of the courses. The purpose of administering two forms of the same survey is to compare students’ perceptions of the online learning environment to that of their instructors. The aggregated program results of the DELES administration from the second week of classes are presented in Figure 1.

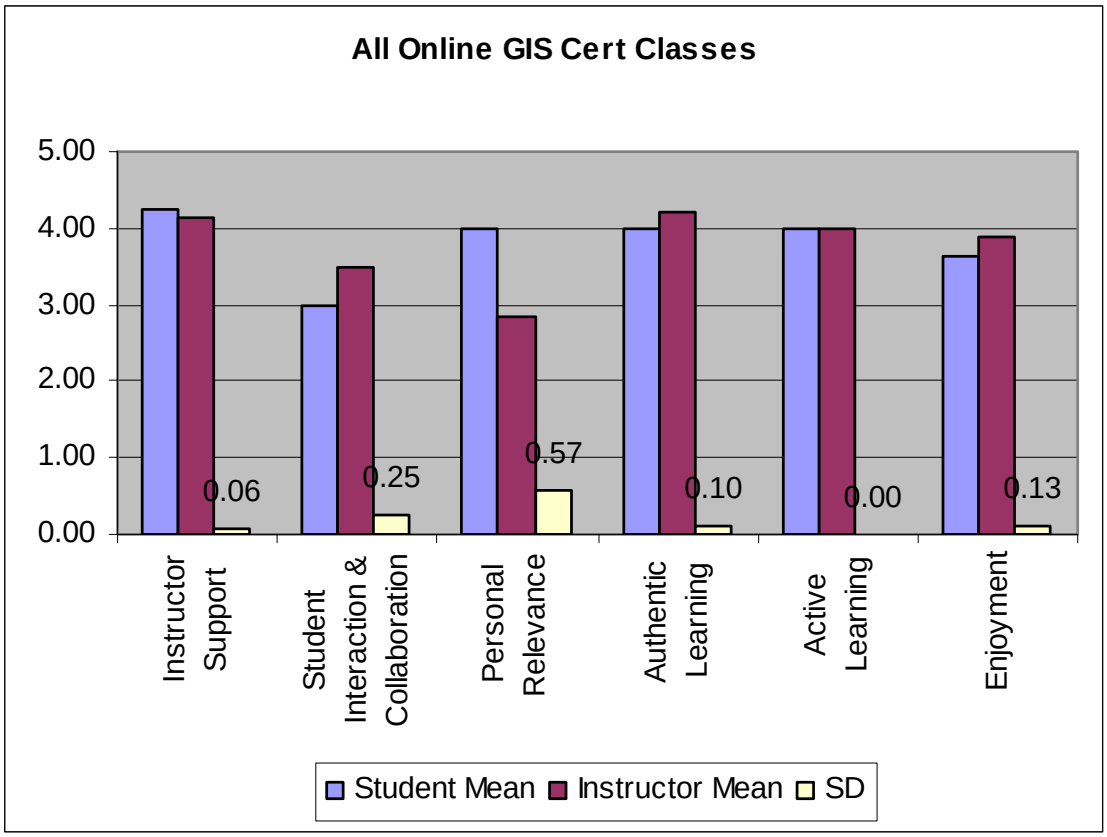

Figure 1. Mean of all four online GIS certificate courses offered during fall 2004. Student *n* = 17, instructor *n* = 2.
(Response scale: 5 = Always, 4 = Often, 3 = Sometimes, 2 = Seldom, 1 = Never. Standard deviations between the instructors' mean responses and the students' are indicated.)

Figure 1 presents a strong picture on the scale of *Instructor Support* whereby the students and the instructors all perceive the learning environment as *Often* including instructor support. On the scale of *Student Interaction and Collaboration* the students have a perception of the environment that is less than that of the instructors. In other words, the instructors have an inflated view of their work in creating a learning environment that has strong student interaction. On the scale of *Personal Relevance* the students' perceptions are strong; they rate the classes as *Often* being personally relevant. Personal relevance has been demonstrated as having the strongest association with student satisfaction in distance education (Walker, 2003).

Students and instructors perceive these online classes as *Often* being *Authentic*—that is, the extent to which students have the opportunity to solve real-world problems. Likewise, the students and instructors perceive the classes as *Often* offering opportunities for *Active Learning*. On the affective-trait scale of *Enjoyment*, the instructors and the students, for the most part, consider distance education as *Often* being enjoyable—a measure of satisfaction.

Observations: In relationship to the aggregate psychosocial learning environments found in the four Online GIS Certificate courses, there is room for addressing *Student Interaction and Collaboration*—the extent to which students have opportunities to interact with one another, exchange information and engage in collaboration. Student interaction plays one of the leading roles in online student satisfaction, retention, and outcomes (Walker 2003; Walker & Resta, 2002).

A sample of the online DELES, reliability information, and validity information is available at: http://insight.southcentralrtec.org/instruments/

Content Analysis Evaluation Component

In order to investigate parity between online courses and face-to-face courses, analysis was conducted regarding the subject matter of the online section of a fundamental GIS class as compared and contrasted to the content of one face-to-face section of the same class. The analysis is presented in Tables 1 and 2 unit-by-unit with grey cells representing content that is not equally covered in the variations of the course.

Table 1. Content comparison between online and face-to-face "lectures." Primary differences are highlighted.

Unit	Online "Lecture" Content	Face-to-Face Lecture Content
1	What geography means to GIS	Introduction, History, and Applications of GIS
2	History of GIS	Scale and Projections
3	Scale	Types of data acquisition
4	Projections	Vector Data
5	Types of Data	Vector Data, cont
6		Raster Data
7	Data Structures (Vector, Raster)	Databases, *TEST*
8	Data Sources	Modeling
9	Data Input	Guest speaker
10	Evaluating Data Quality	Remote Sensing
11	Database Design	DEMs
12	Project	Data mining and visualization
13	Project	Project
14	Project	Review
15		*FINALS*

Although the terms used in each class vary somewhat, the primary differences between the online and face-to-face (f2f) courses include the topics of:

- Data input
- Evaluation quality data
- Modeling
- Remote sensing
- Digital elevation models (DEM)
- Visualizations

Further, these two sections use different text books, complicating equal content coverage.

Table 2. Content comparison between online and face-to-face skill practice (i.e. labs). The primary differences are highlighted.

Unit	Online Skill Practice Content	Face-to-Face Skill Practice Content
1	NONE	Personal Webpage set up
		Introducing ArcGIS
2	Introducing ArcGIS	Projections
3	Working with ArcMap	Vector/Raster
4	Projections	Drawing and Symbolizing/Layouts
5	Drawing and Symbolizing	Data Acquisition
6	Working with Tables	Geocoding
7	Layouts	Tables and Queries
8	Queries	Joins and Overlays
9	Spatial Joins	Spatial Analyst
10		Network Analysis
11	Overlays	*TEST*
12	Project	Project
13	Project	Project
14	Project	

Again, while the terms used by the instructors vary to a degree, the primary differences noted in Table 2 are that in the online version of the class the following content is not addressed:

- Personal Web page development
- Data acquisition
- Geocoding
- Spatial analyst
- Network analyst

Finally, a quick review of the f2f course sections that have the same course numbers as the four online courses in the online GIS certificate program identified that there are content differences from instructor-to-instructor and from semester-to-semester. Therefore, it can be determined that the lack of perfect content uniformity is not related to courses being online versus not being online.

Observations: In terms of equality in content coverage between online classes and face-to-face classes there are differences. However, there are also differences in content coverage when face-to-face GIS classes are compared from semester to semester and from instructor to instructor.

Cost Comparison Evaluation Component

There are a variety of ways to compare the costs of asynchronous distance education courses to the costs of face-to-face courses (Geith & Cometa, 1999). For example, Internet telecommunications line charges, computer aided learning platform (ex. Blackboard, WebCT) software licensing fees, and production time could be figured. However, these detailed data (often buried in university-wide

infrastructure costs) are often difficult to differentiate and are not considered in terms of the costs associated with online education in this evaluation. Likewise, the value of a classroom per square foot, photocopying, classroom presentation equipment, and computer lab hardware/software could be considered as part of the costs for f2f courses in direct comparisons with online courses. Nonetheless, for the sake of simplicity and rapid evaluation, these costs are not considered here. This review considers costs in a very basic way, being restricted to departmental salaries only.

Table 3 presents the salary costs, without benefits, to the department overseeing the delivery of one online GIS certificate course in relation to the same course delivered f2f on-campus. The f2f courses are often instructed by full-time faculty and the salary cost is estimated based on the mean departmental salary for an assistant professor.

Table 3. Salary costs for one course online compared to the same course on-campus

	Online Course	**Face-to-Face Course**
Instructor per class	$3,350 (PhD student instructor)	$7,100 (estimated, full-time faculty instructor)
Teaching Assistant per class	NA	$2,600 (masters student lab asst.)
Total	**$3,350**	**$9,700**

Considering that there are four courses in this program, the total program cost in salaries for the online version equals approximately $13,400, while the salaries for the f2f versions of all four courses adds up to approximately $38,800—a cost difference of $25,400. If a full-time faculty member making the mean assistant professor salary taught each the online courses, the cost would increase to $28,400—a cost difference of $10,400.

Observation: It is obvious that it is less expensive to the department to teach GIS certificate courses online using part-time Ph.D. students as instructors.

Academic Outcomes Evaluation Component

While student outcomes are one of the easiest and most common comparisons made between distance education courses and face-to-face (f2f) courses because outcomes are one of the few consistent and measurable commonalities between the two methods of instruction, they must be considered in light of the many uncontrolled variables related to distance education. Likewise, assuming f2f courses are the ultimate standard by which learning should be measured in higher education is pretentious and can lead to a black-and-white view given what we know about student learning and how higher education is traditionally conducted.

In terms of student grades, Figure 2 presents the distribution of all students' grades aggregated from Spring 2001 to Summer II 2003 for online and f2f GIS certificate courses.

The grades for the f2f courses follow a positive skew, likely characteristic of many university course grade distributions. However, the distribution of grades in the online courses follow a multimodal trend that is nearly the inverse of the f2f courses.

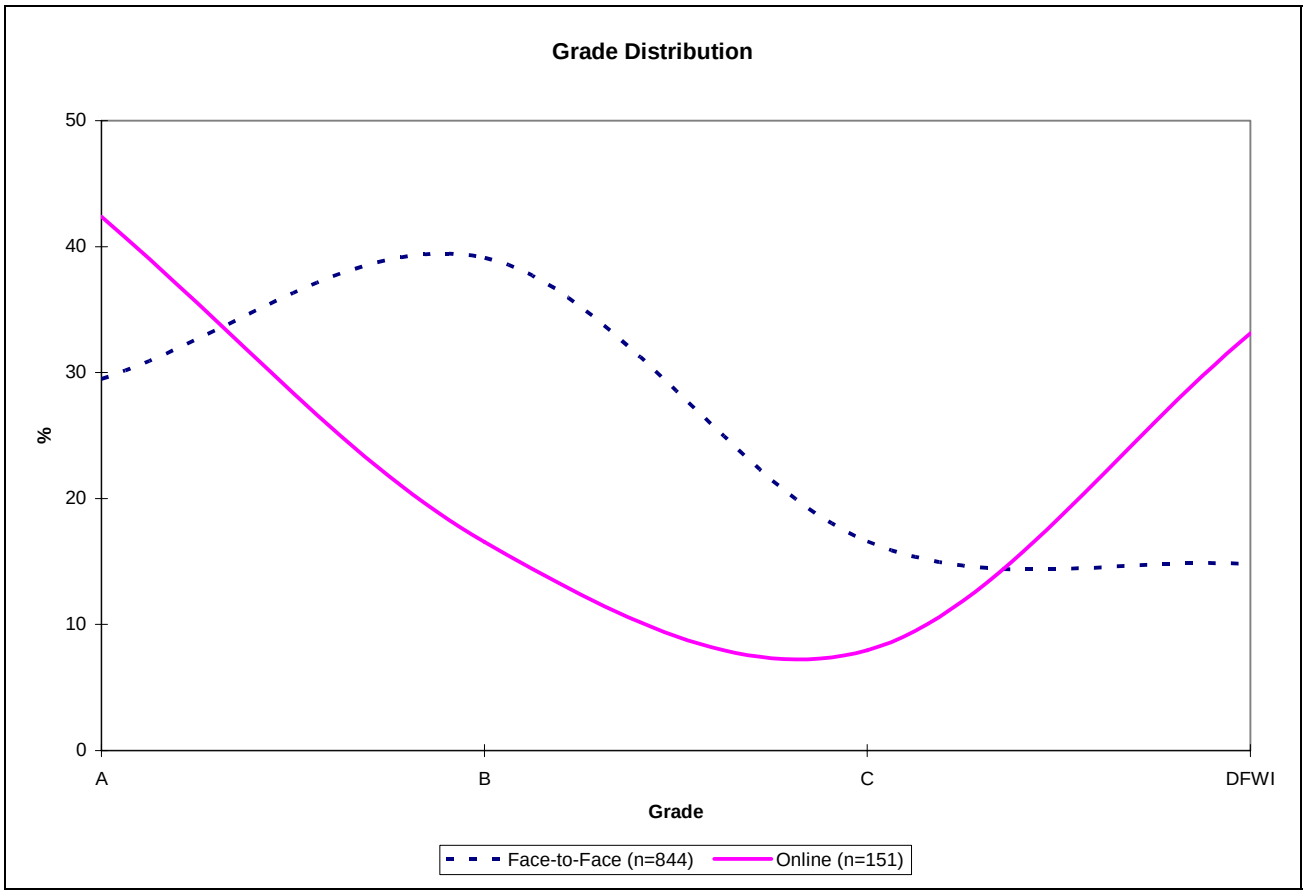

Figure 2. Online GIS certificate course grade distribution 2001 to 2003. (DFWI = Drop, Fail, Withdraw, Incomplete.)

The grade distribution comparison chart in Figure 2 prompted a closer look at grades within the online program with the grades of “D,” “F,” “W,” and “I” broken out (Figure 3) rather than combined as they are in Figure 2.

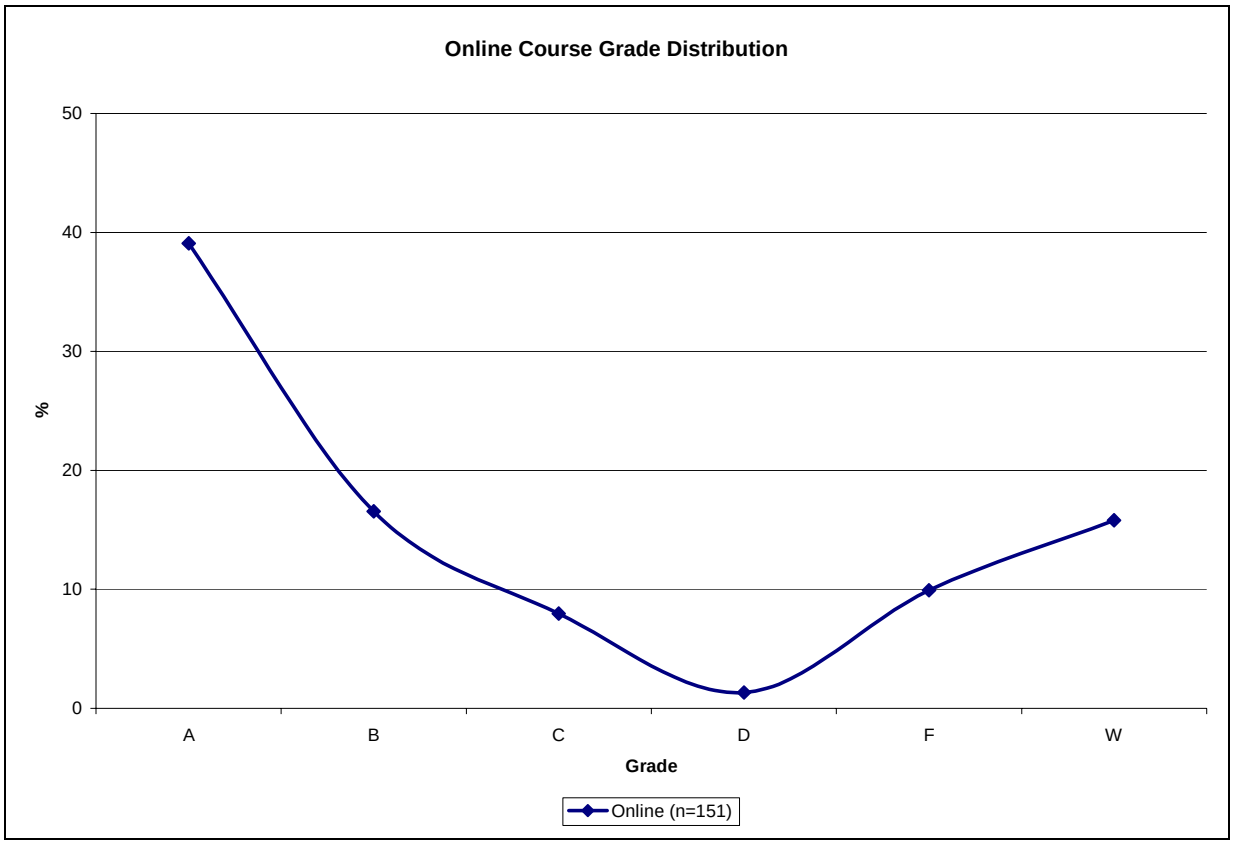

Figure 3. Online GIS certificate course grade distribution 2001 to 2003

Observations: Grade distribution characteristics demonstrate a large dichotomy between distribution of online course grades and f2f course grades, which is counter to what has been found in recent empirical studies elsewhere in distance education (Allen et al., 2004; Alstete & Beutell, 2004). There is also a poor distribution of grades within GIS certificate courses themselves.

Student Retention

Regarding student retention in distance education, Table 4 presents a snapshot of student retention in f2f courses university-wide and in online courses university-wide as benchmarks for the online GIS certificate program. Table 4 also presents retention figures for f2f GIS certificate courses and online GIS certificate courses from the spring 2001 semester to the summer II 2003 semester.

Table 4. Student retention

	Percent Retention
University Retention	
Face-to-Face Courses	94
Online Courses	92
GIS Certificate Program	
Face-to-Face Courses	98
Online Courses	93

Observation: Online GIS certificate course retention appears to hold consistent with university-wide retention rates for both online and f2f courses.

Benchmarking Against Other GIS Certificate Programs Evaluation Component

In order to benchmark the online GIS certificate program for the sake of placing it within the context of similar programs it was compared against 25 other GIS certificate programs at four-year universities across the United States in terms of semester hours required and whether or not other programs are offered online.

The mean required semester hours of all of the GIS certificate programs in Table 5 is 19 semester hours, while the mean is only 16 semester hours for online programs. The online GIS certificate program under review in this paper requires 16 semester hours—consistent with other online programs. Regarding online program delivery, 20% of other university GIS certificate programs are online, while 16% of other programs are offered in some hybrid of online and face-to-face. Sixty-four percent of the GIS certificate programs are not offered by distance.

Table 5. GIS certificate programs

University	Semester Hours Required	Available Online
American River College, Sacramento	27 to 31	No
California State University Bakersfield	20	Yes
California State University Long Beach	*	No
California State University Northridge	15	No
Central Washington University	26	No
George Mason University	24	No
Idaho State University	19	No
Oklahoma State University	21	No
Penn State	11	Yes
San Francisco State University	18	No
San Jose State University	18	No
St. Cloud State University	15	No
St. Mary's University of Minnesota	12	No
University of Alaska Anchorage	32	Some
University of California Riverside	24	Some
University of Connecticut	12	No
University of Denver	24	Yes
University of Maine	16	Some
University of Massachusetts at Boston	18	Some
University of North Alabama	15	Yes

University of North Carolina	**	No
University of Southern California, Los Angeles	12	Yes
University of Texas, Dallas	15	No
University of Utah	22 to 24	No
University of Wisconsin-Milwaukee	18	No

* Consists of completing 10 modules which take up to 120 clock hours to complete
** Consists of five sessions totaling 70 hours of class clock time

Observation: The online GIS certificate program evaluated here is equal to other online programs' required semester hours.

Discussion of Strengths, Weaknesses, Opportunities, and Threats (SWOT)

The remainder of this paper focuses on the online GIS certificate program's strengths, weaknesses, opportunities, and threats (SWOT). SWOT is a model commonly used in business decision-making to allow for somewhat more objective decisions informed by data. While SWOT analysis has been challenged for not having an explicit foundation (Ip & Koo, 2004), it is applied here, despite flaws, to offer deeper insight on this online GIS certificate program, allowing for program administrators to make informed judgments.

Some of the "observations" included in the SWOT are not explicitly derived from the six measurement strategies outlined above. Some result from the subjective opinion of the expert evaluator as discovered in gathering data for the six measurement strategies. This is one of the reasons it is important to have an evaluator who is expert in both the content and the unique delivery of it by distance.

Strengths

- The "modules" in each course are very well developed in terms of organization and clarity.
- The simple fact that the courses are online establishes the department as up-to-date in post-secondary education delivery and that the department reaches out to non-traditional students.
- The instructors are highly skilled in GIS and remote sensing.

Weaknesses

- There is no coordination to ensure parity with face-to-face versions of the courses.
- Staff associated with incoming students have little knowledge of what goes on in the courses (requirements, rigor, content).
- Student-instructor, student-to-student communication requires improvement.
- Course content differs from face-to-face versions of the courses.

- Grading is inconsistent with face-to-face versions of the courses.
- Course materials differ from face-to-face versions of the courses.

Opportunities

- Given the appropriate fiscal, temporal, and human resources the program has a strong external perception to work from and an administrative foundation on which to build.
- There is a dearth of geography-related distance education research; this program could be the subject of empirical studies.
- Distance education is growing and this program can morph to grow with it.
- With only 20% of other university GIS certificate programs being available by distance, there is likely ample market share for growing this program.
- There is potentially high demand for GIS courses and a shortfall of 3,000 – 4,000 individuals with advanced level GIS knowledge and skills (Wright et al., 2004).

Threats

- The current instructors will eventually graduate, leaving the courses without instructors.
- Unique to GIS education is the cost of data, sophisticated software, and robust hardware. Site licensees for GIS software are not available for individuals enrolled in distributed learning environments.

Conclusion

This paper has presented differing perspectives on distance education program evaluation, aside from course evaluation or evaluation of the results of a particular interdictions in a course. It provides a glance at contemporary ideas used in program evaluation in general and in distance education evaluation in particular. It has also presented the state of published program evaluation in distance education that remains challenged with low rigor and makes particular note of the fact that program evaluation in geographic distance education, particularly that of online GIS certificate programs, is lacking. However, multi-modal strategies are offered for measuring online GIS certificate programs. Judgment has been withheld due primarily to the fact that it is not the author's place to make judgments regarding this program, but rather to report on methods that work in one particular institution. While many of the six methods of evaluation are not novel by any means, when combined they provide administrators and decision-makers with an overall program outlook informed by non-biased data that should aid in more objective decisions. Finally, this paper introduces the validated Distance Education Learning Environment Survey (DELES) as a means to consider an altogether unknown area of online geographic education—the online class psychosocial learning environment.

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