

Development of a Multi-institutional, Web-based, Graduate Animal Breeding Course¹

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Abstract

A graduate level, introductory course in animal breeding and genetics was developed and collaboratively taught as a web-based, distance education class for the Spring 1999 semester. A total of 15 students from the University of Arizona (n = 4), New Mexico State University (n = 5) and Texas Tech University (n = 6) enrolled in the course. The class was divided into 13 modules that were completed weekly in conjunction with discussion sessions involving students and instructors at respective locations. Course materials were delivered through internet-based software. A joint meeting was held during the middle of the semester. Students from different institutions were required to write collaborative research grant proposals. Survey of students at the course completion revealed that they enjoyed interactions with students and professors at other institutions and that the arrangement of course material into modules was both acceptable and useful. They also found weekly discussion sessions useful. Most students felt that the largest challenge in the course was the collaborative research proposal. This course format should be useful for teaching other animal science graduate courses through distance education, and will be less expensive than many other distance education formats.

Introduction

Numbers of graduate students and faculty in the field of Animal Breeding tend to be limited in the agricultural colleges and universities in the United States. Therefore, this course was developed increase exposure of our students to graduate faculty with diverse expertise in animal breeding and genetics. There has been an increase in the number of distance education courses offered by institutions of higher learning; however, distance education courses in animal breeding and genetics are limited. Seykora (1996) discussed teaching a course in animal breeding through distance education, but it was not internet-based.

The delivery of information in agricultural higher education is changing. Use of distance education courses and use of various technologies have steadily increased. Also, more inter-institutional cooperation is formally developing. Schoknecht and Hafs (1999) recently described a formal collaborative arrangement to share undergraduate animal science students that involves multiple universities of Northeast and mid-Atlantic states. Distance education courses require extensive amounts of planning and coordination before instruction begins (Jackson, 1995). Diebel et al. (1998) stated that as more distance education courses are offered, professors must develop new skills for curriculum development and delivery. Jackson (1995) emphasized the importance of useful evaluation of distance education courses to determine both prior knowledge level of students and course effectiveness. Furthermore, educators must be effective in using new technologies by encouragement of student interaction and use of meaningful course evaluation (Diebel et al., 1998). Although adding variety to teaching methodology is important (Schurle, 1997), we believe, as many others do, that variety and technology can not be substitutes for thoughtful planning and delivery. Development of our course was an attempt to have multi-institutional instruction of animal breeding and genetics involving these three universities, and to potentially provide a model for other courses to follow.

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Materials and Methods

This course was developed by the instructors to offer a more diversified education to students enrolled in a graduate level animal breeding and genetics course. The course was internet-based and offered using the software package titled Webct (Universal Learning Technology, Inc., Peabody, MA). The course materials were outlined into 13 modules, one covered per week. The material for each module consisted of (1) a set of learning goals, (2) a set of notes from the instructor on main points and (3) a reading assignment that included text and journal articles. Instructors constructed files for goals, notes and reading assignments in Word97 (Microsoft Corporation), saved files as HTML format and loaded the files directly onto a server through the software.

The grades for the course were based on three take home exams (25% each) and one multi-institutional research proposal. Students were assigned to groups of three, where at least two institutions were represented. Student groups decided their own topics for grant proposals. Guidelines for the proposals followed that of the USDA-National Research Initiative program.

Each week a one-hour discussion was held at each university to discuss the module materials. These sessions followed the format of question and answer and general discussion, not traditional lecture, since the students had the notes and read assignments prior to meeting. Furthermore, for each weekly session, a student was assigned as the discussion leader. Materials were posted sequentially seven days prior to each weekly meeting.

Students were given instructions about logging into the Webct server at the beginning of the semester, and were responsible for setting up their unique user ID and password codes. Students used these codes to access their grades through the semester and determine their standing relative to the class average. Students and instructors communicated through bulletin board postings and email. Several topics were discussed through bulletin board messages, with varying levels of participants. All exams were posted on the bulletin board, but students were required to submit exam answers by email. Exam questions for each module were written and posted by the professor that composed the respective modules (Table 1.). Dr. Thomas, trained as a physiologist and molecular biologist,

TABLE 1. Course layout by module title and sequence

Module	Topic
1.	Gene structure and function
2.	Population genetics
3.	Heritability and repeatability
4.	Selection response
5.	Multiple trait selection
6.	Biological diversity and conservation
7.	Genotype x environment interactions
8.	Genotype x genotype interactions
9.	Composite breed development
10.	Gene mapping and discovery
11.	Marker-assisted selection
12.	Molecular genetic manipulation
13.	Ethics of genetics research

composed modules 1, 4, 6, 7, 10, 12, and 13, while Dr. Herring, trained as a quantitative geneticist, composed modules 2, 3, 5, 8, 9, and 11. Students emailed exam question answers to the proper professor.

One satellite review session was conducted prior to Exam I. However, for Exams II and III, a live "chat" session through the software was utilized as question and answer review sessions. Additionally, a group meeting in Las Cruces was held mid-semester to facilitate groups to work collaboratively on research proposals and for all participants to get to know one another in person. In conjunction with the group meeting, several guest speakers gave presentations related to animal breeding and genetic research.

A survey was conducted to assess student perceptions about distance education at the beginning of the course. The questions for this evaluation are presented in Table 2. Furthermore, another student assessment of the course was conducted at the end of the semester before students learned their final grades. The surveys were distributed by email through Webct to each individual student; students emailed their responses back to a single instructor. The survey was composed of 15 questions, 12 of which were answered on a 1 to 5 Likert type scale (5 = strongly agree, 4 = agree, 3 = indifferent, 2 = disagree, 1 =

strongly disagree) for statistical summarization, and three which were short, essay type questions. These survey questions are presented in Table 3.

Results and Discussion

Fifteen students enrolled in the course for the Spring 1999 semester with six students at Texas Tech University (TTU), five at New Mexico State University (NMSU), and four at the University of Arizona (UA). Students at different universities enrolled in the course at their respective university. The results of the beginning of semester student survey are summarized in Table 4. The classification of students and exposure to previous distance education courses is confounded with institution, so no major conclusions can be made from these data as they pertain to other circumstances. Most of those enrolled were M.S. students. One Ph.D. student was enrolled from both TTU and UA. All four of the B.S. students were from NMSU. Of the 15 students beginning the course, one each from TTU and NMSU dropped the course early in the semester. Students in this course reported higher email and internet use than undergraduates recently surveyed in a senior-level animal science course (Herring and Barham, 1999). Of the six students that had previously taken a distance education course, four were from TTU, and two were from UA. The two from UA had positive experiences with their previous

TABLE 2. Questions from survey instrument at course initiation

1. Provide your institution and degree sought.
 2. How many e-mail messages do you normally send per week?
 3. How many times per week do you access the Internet?
 - 4a. Have you ever been involved in a distance education course before?
 - 4b. If so, what was your impression?
 5. What have you heard other students say about distance education courses?
 - 6a. Have you ever been involved with a web-based course before?
 - 6b. If so, what was your impression?
 7. What have you heard other students say about web-based courses?
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TABLE 3. Questions from end of course evaluation instrument*

1. The arrangement of materials into weekly modules was acceptable.
 2. The arrangement of materials into weekly modules was useful.
 3. The weekly discussion sessions were useful.
 4. This type of distance education course was useful to teach this material.
 5. The group meeting in Las Cruces was useful.
 6. The scheduled chat sessions were useful.
 7. The bulletin board was acceptable for posting discussions.
 8. The bulletin board was acceptable for posting exam questions.
 9. Email was acceptable for exam answers and proposals.
 10. You would recommend this course to other students.
 11. The instructors were:
 - a. Approachable
 - b. Knowledgeable
 - c. Responsive to students
 12. You liked covering the material at your own pace as opposed to lectures for three hours per week.
 13. What did you like best about the course?
 14. What did you like least about the course?
 15. What aspects of this course would you change?
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*Questions 1 through 12 answered on scale of 5 = strongly agree, 4 = agree, 3 = indifferent, 2 = disagree, 1 = strongly disagree

course, whereas the four from TTU reported negative experiences (all from same course). None of the students enrolling in our course had previously taken a web-based course, and 82% had heard nothing about web-based courses from others; one student had heard of a negative experience, and one had heard of a neutral experience.

The web classroom was accessed at total of 1520 times with the number of hits per section within a module averaging 7.8 hits per student. Therefore, providing evidence to suggest that students logged into the classroom and viewed course materials multiple times during a week. As the answers to the quantitative questions (1 - 12) for the course

assessment were studied, it can be seen that overall, the students found the course to be favorable for graduate study.(Table 5) However, there were some specific areas that can be improved. Students appeared not to strongly feel that this type of distance education course was useful for teaching this type of material (Question 4: 3.67 on 5 point scale). Responses to questions 13 - 15 give insight to this. Six (46%) of the students stated that the group research proposal was the item they liked least about the course; additionally, three stated that use of the web classroom was frustrating in general. This frustration was most likely the consequence of limited internet access on university

TABLE 4. Results of student distance education perception survey at beginning of the course

Questions	Response
1. Institution and degree.	13% Ph.D., 60% M.S., 27% B.S. 40% TTU, 33% NMSU, 27% UA
2. Email messages sent per week?	Mean 16.1, SD ^z 14.9, range 3 - 50
3. Internet accesses per week?	Mean 14.2, SD ^z 8.9, range 4 - 30
4a. Distance education course before?	54.5% yes, 45.5% no
4b. Impression of previous distance course?	67% negative, 33% positive
5. Heard about distance education courses?	50% negative, 40% nothing, 10% neutral
6a. Web-based course before?	100% no
6b. Impression of previous web course?	Not applicable
7. Heard about web-based courses?	82% nothing, 9% neutral, 9% negative

^zSD = standard deviation

campuses and slow server communication between institutions and not a result of corruption in the utilized software packages. When asked what the students would change about the course (Question 15), six (46%) wanted to change or eliminate the group research proposal. Question 6 asked about usefulness of scheduled chat sessions, and this question received the next to lowest score (3.82). Three of the students suggested having more chat sessions and to not use them only before exams as reviews.

Of the questions with the higher ratings, the questions pertaining to perceived knowledge, responsiveness and approachability of professors (Questions 11a-c) ranged from 4.78 to 5.00. We believe that some students may have problems getting maximum usefulness from this course because more responsibility is placed upon them. When the

student believes the professors are knowledgeable, approachable and responsive, but the student does not get as much out of the course as he or she wanted, there is a problem in the delivery system or the student motivation, or both. Other questions that got high marks related to arrangement of materials into weekly modules (4.67), posting of exams on bulletin board (4.58), the group meeting in Las Cruces (4.55), and the weekly discussion sessions (4.50).

In regard to what they liked best about the course (Question 13), five (38%) of the students commented that the interactions with professors and students at different universities was important. Five (38%) students said the weekly discussion sessions were what they liked best. This corresponds to results of Diebel et al. (1998) where students

TABLE 5. Results from end of course student evaluation

<u>Question</u>	<u>N</u>	<u>Mean[†]</u>	<u>SD[‡]</u>	<u>Range</u>
1. Module arrangement acceptable	12	4.67	0.49	4 - 5
2. Module arrangement useful	12	4.67	0.49	4 - 5
3. Weekly discussions useful	12	4.50	0.52	4 - 5
4. Type of course useful	12	3.67	0.98	2 - 5
5. Group meeting useful	11	4.55	0.52	4 - 5
6. Chat sessions useful	11	3.82	0.75	3 - 5
7. Bulletin board discussions	12	4.42	0.67	3 - 5
8. Bulletin board exam posting	12	4.58	0.67	3 - 5
9. Exams by email acceptable	12	4.25	0.87	2 - 5
10. Recommend course to others	12	4.42	0.67	3 - 5
11A. Instructors approachable	9	4.78	0.44	4 - 5
11B. Instructors knowledgeable	9	5.00	0.00	5
11C. Instructors responsive	9	4.89	0.33	4 - 5
12. Pacing yourself for material	12	4.33	0.78	3 - 5

[†]Scale of 5 = strongly agree, 4 = agree, 3 = indifferent, 2 = disagree, 1 = strongly disagree

[‡]SD = Standard deviation

preferred to spend time for discussion groups with on-site faculty or other students. Additionally, Miller et al. (1996) reported from a student survey of a distance education courses that personal contact between instructors and students was highly desired. We also believe that professors need personal contact with their distance education students to sustain teaching motivation. The fact that our students liked the inter-institutional interactions, in combination with expressed frustrations about correspondence between students at different locations, shows that they wanted to have convenient interactions with other institutions. There did appear to be some mechanical problems from time to time in sending email messages through the server. In the future, students must be made to realize that deadlines for assignments take on a new

meaning when working with others at different locations.

Many fear the costs (time and money) involved with establishing a distance education course. The monetary inputs for this course were minimal. The instructors invested considerable time for training and material development, but probably no more time and effort than that involved for development of a traditional course. The only departmental expenses involved were travel costs to Las Cruces for the joint meeting. Other departments with limited faculty should consider development of web-based graduate level courses so that their students can obtain exposure to other professors and students with related and diverse interests within a field. Jackson (1995) emphasized that distance education courses needed more planning and coordination than most traditional courses. We believe that once the

course has been developed and established, this format could actually improve class-related time commitments of faculty without sacrificing course content or student education. Based on both our personal impressions and student feedback, we feel that the benefits of this course far outweighed the limitations for our situation. However, the effectiveness of this type of course format will always vary considerably among instructors, and it will not be desired or useful by some.

Summary

This course was developed to provide students at Texas Tech University, New Mexico State University and the University of Arizona enhanced exposure to professors with diverse expertise and students with related interests in animal breeding. Use of the Internet provides a powerful mechanism for this type of distance education course. The use of technology such as this must not come at the sacrifice of course material content. Many (38%) of the students thought the interaction with professors and students at other institutions was the best aspect of the course, while many others (38%) thought the weekly discussion was the most enjoyable aspect. However, most students also thought that the research proposal that required inter-institutional collaboration was the main limitation about the course. In a course such as this, the students must be made aware that when there is less formal class time, there is more of their time outside the classroom that must be devoted to the course. The general format of these types of courses

should be flexible enough to use as a model for a variety of graduate level courses in agricultural sciences taught through distance education.

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Readability of Turfgrass and Golf Course Management Textbooks, Periodicals, and Work-Related Manuals

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Abstract

We determined the readability indices of turfgrass and golf course management textbooks, periodicals, and work-related manuals by the Flesch method. These indices indicate that a) the readability of several commonly used turfgrass and golf course management textbooks is at the appropriate college level, b) the readability of feature articles in several turfgrass and golf course management related periodicals is at the same level as college textbooks, and c) the readability of some employee manuals is at the same level as college textbooks.

Introduction

Textbooks and periodicals are a crucial part of the teaching and learning experiences in turfgrass and golf course management courses. Textbooks, periodicals, and work-related manuals are important sources of information for graduates and other personnel in turfgrass and golf course management careers. However, in order for individuals to effectively use these materials, they must be able to comprehend what they read.

Therefore, the readability level of written materials that turfgrass and golf course management students and employees are required to use in educational and career settings is of major importance. College instructors and employers should be aware of, and concerned about, the

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