Evaluating the Performance and Acceptance of Teleconference Instruction
Versus Traditional Teaching Methods for Undergraduate
and Graduate Students

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Abstract
Institutions are currently seeking alternative ways to deliver a full-line of course materials without
acquiring additional staffing. Hence, faculty is charged
with creating alternative ways to deliver or offer course
content to students. The purpose of this study was to evalu-
ate undergraduate and graduate performance and perception
of teleconferencing versus traditional blackboard lectures. In the undergraduate course, we discovered that
students performed equally as well on exams and provided
favorable reviews of the course; however, the acceptance
of this new format is lacking given the enrollment and
number of students dropping, e.g., 30 to 40% reduction in
the course before semester’s end. On the other hand, stu-
dents taking the graduate course appear to accept the tech-
nology well with consistent enrollments and achievement
in course content. In summary, using teleconferencing as
a way to teach students may be better suited for graduate
students when compared to undergraduates.

(Key words: teleconference, undergraduate, graduate, learning)

Introduction
The term “information superhighway” was coined by
Albert Gore (Bauer, 2000). The former vice-president uses
the expression interchangeably with “electronic high-
way” and “National Information Infrastructure”. The pri-
mary charge of the National Information Infrastructure is
to make the government work better, making the United
States a world leader in science, engineering, and technol-
yogy, and perhaps most importantly, deliver to all Ameri-
cans the information they desire when they need it and
when they want it—at an affordable price. The Internet
is one of the earliest large network systems. The Internet
was established in the early 1980s, when the National
Science Foundation established a system of five na-
tional supercomputer centers to serve the research com-
munity and to link the centers to all the nation’s campuses
via a long-distance network (Mitchell, 1994). Since its
creation, the Internet has grown from less than 200,000
networked computers in 1989 to over 2.2 million in 1992
(Mitchell, 1994). According to the Internet Industry Alman-
ac, there were nearly 579 million Internet users worldwide
by the end of 2000; not surprisingly, the United
States has nearly 164 million Internet users or 28% of the
total worldwide (Computer Industry Almanac, 2000). It
is very clear that Internet usage and technology has in-
creased rapidly over a very short period. The usefulness
of the Internet through advanced technologies has made
distance learning (DL) very attractive to consumers and
universities. Perhaps this technology came at a good time
because of the need to maximize all available resources.

In general, budget constraints have increased through-
out many college campuses; therefore, the luxury of offer-
ing a full curriculum of courses may be a thing of the past;
faculty are charged with implementing creative
measures to assure that course content can be dissemin-
at ed or acquired by individuals or both. Through the use
of DL technologies, the need to disseminate or acquire
knowledge may be accomplished. And in many cases,
DL technologies allow people with and without specific
expertise to join forces for one common goal. In fact,
the Committee on Institutional Cooperation (CIC) has
encouraged collaboration among and beyond CIC institu-
tions (CIC, 1999). There is a clear trend for multi-institu-
tional collaboration among universities, i.e., instruction,
extension, and research.

The objectives of this paper are to evaluate the perfor-
ance and acceptance of undergraduate and graduate
instruction using teleconference technology in the class-
room.

Abbreviation Key: CIC = Committee on Institutional Cooperation;
DL = distance learning; IPFW = Indiana Purdue Fort Wayne; MSU =
Michigan State University.


The materials and methods section is as follows:

**Materials and Methods**

**Teaching an Undergraduate Course by Teleconferencing**

“Introduction to Animal Sciences” (ANSC102) is a three-credit (2 hours of lecture and 1 hour of laboratory) level course and taught in both fall and spring semesters at the main campus of Purdue University. The course was investigated; that is, students were allowed to study the effects on student performance on grades, perception of the course, and least about the course.

The facilitator. In addition to comparing student performance on grades, perception of the course, and least about the course.

### Table 1. Comparison of overall scores between the Purdue University (PU) main campus course (ANSC102) versus the Fort Wayne branch campus course (ANSC101) and ANSC555 at PU versus the ANSC555-like course received at Michigan State University

<table>
<thead>
<tr>
<th>Course</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC101</td>
<td>81.0 ± 9.6</td>
</tr>
<tr>
<td>ANSC102</td>
<td>78.9 ± 7.9</td>
</tr>
<tr>
<td>ANSC555</td>
<td>83.6 ± 2.5</td>
</tr>
<tr>
<td>ANSC555 at Michigan State University</td>
<td>86.1 ± 4.5</td>
</tr>
</tbody>
</table>

1The overall means and standard deviation are shown for the four classes.

**Teaching a Graduate Course by Teleconferencing**

“Animal Growth and Development” (ANSC 555) is a two-credit dual level course that has been taught for the past 5 yr during spring semester at Purdue University. The course covers the fundamentals of mammalian and avian development and then applies these concepts to discussions of the molecular mechanisms regulating animal growth and body composition. Since much of the course content is based on current research, the reading material for each topic includes review articles, book chapters, and primary research reports. Textbooks are used as reference materials. During the spring semester 2000, the course was also offered at Michigan State University (MSU) by two-way video conferencing from Purdue University. There were 17 students enrolled at Purdue University (11 graduate, six undergraduate) and five at MSU (four graduate, one undergraduate). One of the Purdue University undergraduates was from the School of Science, and one was an exchange student from Poland; all of the remaining students were majoring in Animal Sciences. At MSU, the four graduate students were majoring in Animal Sciences, and the undergraduate student was enrolled in the premed program. A faculty member served as a facilitator for the class at MSU.

The class met twice weekly for 50 min in a videoconferencing studio on the Purdue University campus. This studio seats a maximum of 40 students. Students at MSU met in a similarly equipped studio on their campus. The video and audio broadcast was controlled by technicians located at each studio and link-up before each class was initiated by the MSU studio. The reading material for each topic was copied by the instructor and distributed to students at Purdue University and faxed to the facilitator at MSU. The primary reading list for the semester was available on a website.

Grades for the semester were based on the student’s performance on three exams. The exams were written by the instructor and faxed to the facilitator at MSU along with the answer key. Grading at MSU was done by the facilitator.

**Teleconferencing Technology Used**

Students taking the ANSC101 or ANSC555 at MSU received the video signal from a distance education studio on the Purdue University campus. For the ANSC101 course, the only individuals were the instructor and computer technician for all the students taking the class were at the IPFW campus plus one facilitator. As for the ANSC555, (n = 17) students were in the studio along with the instructor and computer technician, while the signal was sent to five students at MSU plus the facilitator. For both courses, the studios would be linked-up before each class which was initiated from the Purdue University. The Purdue University studio was equipped for PowerPoint presentation as well as for slides, overheads, and video.

At the main campus, the visuals were shown on two 78.74 × 78.74-cm screens (one showing the remote class and the other the instructor’s lecture materials) located on each side in the front of the room. Video image for the students at IPFW were made available on a 78.74 × 78.74-cm screen in the front of the class.
dents immediately dropped the course, so the class was
previous findings (Latour, 2002); more specifically, four stu-
news disturbed students, which was consistent with pre-
cencing and not by “traditional” classroom lecture. This
that future lectures would be delivered via videoconfer-
and then by email. The instructor decided to bring the
professor to the classroom, b) talk to the professor in
person and not over email, and c) do more hands-on
laboratories. The dislikes are not surprising and to some
degree could be anticipated; however, they may have a
significant influence on the course; that is, after the second
year of teaching this course via teleconference the drop
out rates ranges from 30 to 45%, which is extremely high
and very uncharacteristic of courses offered by this in-
structor or Purdue University.

78.74-cm television screen. Microphones were located in
front of each student at both sites, so questions could be
heard in both settings. Each class was tape-recorded, and
all of the videotapes were made available to the students
throughout the semester. The primary course notes as
well as additional reading material were made available
on a web page, which was identical for both courses.

Statistical Analysis

Comparisons between locations were based on the stu-
dent’s performance on exams. Since these exams offer
discrete findings, a nonparametric test was used, the
Kruskal-Wallis test of scores. Also reported are the con-
sensus statements used in a perception test for the
ANSC101 course, in which students voted on their top
issues of acceptance and concern for the class.

RESULTS AND DISCUSSION

There were no differences in student performance on
exams for ANSC101 or ANSC555, when comparing
grades from the main campus with those obtained at the
remote site (Table 1), although the overall mean for both
remote sites (IPFW and MSU students) were numerically
higher than the average mean on campus. Despite the
similarities, the ANSC101 course experienced a number
of issues.

For the first lecture in ANSC101, the instructor visited
the class to give the lecture in person and communicate
that future lectures would be delivered via videoconfer-
encing and not by “traditional” classroom lecture. This
news disturbed students, which was consistent with pre-
vious findings (Latour, 2002); more specifically, four stu-
dents immediately dropped the course, so the class was
down to 20 by the end of the first lecture. The remaining 20
students welcomed the companion information provided
through a WebCt2 webpage and the transfer of informa-
tion via email.

Despite favorable evaluations, the commitment to com-
plete the ANSC101 course was lacking and most likely
resulted from the teleconference format (Table 2); more
specifically, there were virtually no differences in instruc-
tor evaluations as shown in Table 2, when comparing
student responses on campus, ANSC102, versus students
taking ANSC101. However, the students strongly stated
their dislike for the DL format as evidenced in responses
in Table 2. Some of this dislike may have resulted from
an inquiry of how to make the course better, in particular
students at the IPFW campus stated that they would like
to get some of the “hands-on” experience that students
obtained in ANSC102.

The students at the IPFW campus were also offered
the opportunity to express their views on these two broad
questions: a) what do you like about this course and b)
what specific suggestions do you have for changing this
course? These two questions were facilitated by a staff
member from The Center of Instructional Excellence. In
this process, the students had to discuss and rank their
highest issue by voting within the class and concluded
the following: a) the students enjoyed having Internet
access to notes, b) the professor, c) broad base of knowl-
edge about agriculture, and d) getting to participate in a
few test questions. The students would like to see the
following changes, and they are as follows: a) bring the
professor to the classroom, b) talk to the professor in
person and not over email, and c) do more hands-on
laboratories. The dislikes are not surprising and to some
degree could be anticipated; however, they may have a
significant influence on the course; that is, after the second
year of teaching this course via teleconference the drop
out rates ranges from 30 to 45%, which is extremely high
and very uncharacteristic of courses offered by this in-
structor or Purdue University.

<table>
<thead>
<tr>
<th>Questions</th>
<th>ANSC101</th>
<th>ANSC102</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This course builds understanding of concepts and</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>principles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. My instructor seems well-prepared for class.</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>3. Students are encouraged to see the instructor if</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>they are having difficulty.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. My instructor gives exams which accurately reflect</td>
<td>4.6</td>
<td>4.7</td>
</tr>
<tr>
<td>the course material.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Cheating is a problem in this class.</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>6. The climate of this class is conducive to learning.</td>
<td>4.1</td>
<td>4.3</td>
</tr>
<tr>
<td>7. This course effectively challenges me to think.</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>8. Overall, I would rate this course as:</td>
<td>4.1</td>
<td>4.6</td>
</tr>
<tr>
<td>9. Overall, I would rate this instructor as:</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Overall mean (Does not include question 5)</td>
<td>4.4</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Additional questions asked to the students at IPFW regarding the distance learning format
1. The distance learning format is effective.         | 1.4     |
2. My instructor is always considerate of distant students. | 4.6     |
3. The local site coordinator is helpful.             | 4.1     |
4. The course makes excellent use of technical technology. | 3.9     |
5. The video signal is of good quality.               | 2.3     |

1Students could provide a score from 1 to 8 (1 is the lowest and 8 the highest).
In evaluating the graduate course, a different set of questions were used. Also, the questions were given at both the midterm and final to test whether student perception had changed over the course period. Again, students were allowed to rank a question between 1 and 8 (8 being the highest) on 10 questions. For this course, there were no statistical differences noted between midterm vs. final scores of the course (Table 3), with the scores themselves being very high (lowest 6.7). However, there were some significant differences between the universities as measured by student response. Specifically, when comparing student responses for each question between the two universities, questions 7 and 8 in Table 3 were found to differ between universities. Students at MSU, scored question 7 (encourages free exchange of ideas) lower ($P < 0.0329$) when compared to student responses at Purdue University, 6.5 vs. 7.3, respectively. Moreover, students at MSU scored question 8 (is available outside of class if needed) lower ($P < 0.0333$) when compared to student responses at Purdue University, 7.0 vs. 7.7, respectively. These responses are not completely surprising, since the instructor and facilitator noted that students did not interact equally to previous experiences in teaching like courses in a traditional classroom. Apparently, the environment (DL) influenced this, because the facilitator felt students would not interact in front of the camera, but following class would frequently meet and discuss the topics discussed in class with classmates and the facilitator. Even though there was a difference noted in “exchange of ideas” and “assistance outside of class” students at MSU gave the instructor a score of 4.0 (0 to 5 scale, with 5 being the highest) for the core university question “this course is among the best I have ever taken.” Likewise, the MSU students gave the instructor a score of 4.5 for the university core question “this instructor is among the best teachers I have known.” Despite these differences, the graduate course has maintained a good enrollment and retention as compared to the undergraduate course.

The current paper demonstrates that DL has potential in a teaching environment as students did perform equally as well on exams. At present, however, the DL format seems inappropriate for the undergraduate course, and the acceptance of this technology may become easier as students further embrace DL and as the technology improves. The graduate course seems to be better accepted, and this may be a greater function of maturity, thus, students recognize the importance of the course and overlook “not having the instructor in the class.”

Perhaps one of the biggest weaknesses of DL is the lack of feedback that the instructor can receive from the student while teaching a course, that is, to visually see whether a student has picked up on a concept, talking or playing around with a classmate, or seems tentative.

The actual savings in terms of dollars were not calculated in this study, but this study validates that an additional faculty member was not needed at Michigan State University to teach a graduate course in Growth and Development but rather to have an existing faculty member sit in the class and assist in facilitating the class. Even though the acceptance of the technology was not as high for the undergraduate course, an additional faculty member is not “technically” needed at the Fort Wayne campus; however, the long-term success of the offering at Fort Wayne may require an “in class instructor.”

### REFERENCES

Bauer, W. 2000. Multimedia collaborative content creation (mc3)—How we can make the best use of each others work. [http://www.pa.msu.edu/~bauer/talks/Vienna2000/sld001.htm](http://www.pa.msu.edu/~bauer/talks/Vienna2000/sld001.htm).


