Choosing Educational Modalities: Online vs. Face-to-Face

A Master’s Thesis Study
By
Benjamin Dan Harlott

Why this Study?

“Traditional Education”

• Face-to-face lecture based coursework
• Standard of instruction modalities
• Distance learning also has a long history
  • Caleb Phillips (1728) Boston Gazzette
    - (Holmberg, 2005)

Definitions

• Distance Learning Defined
  – Mail correspondence courses
  – Computer assisted learning
  – Distance Learning Classrooms
  – Learning Management Systems
  – Fully online educational environments

Prevalence of Distance Learning

• Studies conducted in 2001:
  – “56% (2,320) of all 2-year and 4-year Title IV-eligible, degree-granting institutions offered distance education courses”
  – 89% of public 2-year and 4-year institutions provided distance education courses
  – 57% of undergraduates enrolled in internet-based distance education during the 1999-2000 school year.
Basic Pros & Cons

- Gangé, Golas, Keller, & Wagner (2005):
  - "Vast Resources"
  - Asynchronous or synchronous delivery options
  - Diverse multimedia potential
- Monolescu, Schifter, & Greenwood (2004):
  - Greater flexibility and increased access
    - Fewer Educational roadblocks
  - Diverse exposure (world wide interconnectivity)
  - Increased computer skill training

Three Major Arguments

1. The "digital divide" - Those with experience vs. those without
   - Such individuals are at a disadvantage
   - Senaidi at the University of North Texas (2008)
     - Students in developing Arabian countries without experience
     - Learned subjects and increased computer skills
     - Opportunity to turn weakness into strength

Three Major Arguments

2. Procrastination:
   "Things may come to those who wait, but only the things left by those who hustle" – Abraham Lincoln
   - Artino & Loannou (2008) state that there must be some shift in responsibility from teacher to learner
     - Training people to learn how to learn
   - Need not abandon structure

Three Major Arguments

3. Cheating
   - A rampant problem in higher education
   - In one study up to 87% of business students admitted to academic dishonesty. - Rakovski (2007)
   - Moran & O’Reilly (1999) are optimistic
     - Online learners are not interested in cheating
   - Palloff & Pratt (2003) are more realistic
     - Occurs with about the same prevalence
     - Harder to control

Efficacy Research

- Monolescu, Schifter, & Greenwood (2004) found no significant difference in an Upper-division undergraduate economics course.

- Limitations:
  - Differences in # of assignments
  - Sampling error: Students picked their environment
  - Lack of randomization

Efficacy Research

- Feng, Gardner, and Lancette (2008) also found that there was no significant difference between online and face-to-face delivery (p. 2025).

- Limitations:
  - Small sample size
  - Sampling error: students picked their environment
  - Lack of randomization
  - Inherent Instructor bias (as referenced by Hall et al.)
What about CSED Courses?

- Healthcare studies often focus on the use of online learning for continuing education and training (Malone, 1997; MacDonald, Stodel, & Casimiro, 2006)
- Few have focused on the efficacy of such programs when applied to programs such as nursing, physical therapy, or speech therapy.

Methods

- **Type of Study**
  - Modified mixed research ABCABC counter-balanced design.
  - Collection of data through pretests, posttests, a demographics questionnaire and a satisfaction survey (See Appendix A for examples).
  - A test was given at the onset of the course as well as at the end to measure overall knowledge change.

Research Questions:

- Are online courses really better or just as good as in person coursework?
- Can they be applied to all formats of classes (i.e. health science labs)?
- What are the challenges and benefits?

Methods - Lab Administration

<table>
<thead>
<tr>
<th>Labs &amp; Topics</th>
<th>Traditional</th>
<th>Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 1 Respiration</td>
<td>Group 2 P &amp; B</td>
<td>Group 1 P &amp; B/Group 3</td>
</tr>
<tr>
<td>Lab 2 Phonation</td>
<td>Group 1 P &amp; B</td>
<td>Group 2 P &amp; B/Group 3</td>
</tr>
<tr>
<td>Lab 3 Articulation</td>
<td>Group 2 P &amp; B</td>
<td>Group 1 P &amp; B/Group 3</td>
</tr>
<tr>
<td>Lab 4 Mastication/Deglutition</td>
<td>Group 1 P &amp; B</td>
<td>Group 2 P &amp; B/Group 3</td>
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<tr>
<td>Lab 5 Hearing</td>
<td>Group 2 P &amp; B</td>
<td>Group 1 P &amp; B/Group 3</td>
</tr>
<tr>
<td>Lab 6 Neuroanatomy</td>
<td>Group 1 P &amp; B</td>
<td>Group 2 P &amp; B/Group 3</td>
</tr>
</tbody>
</table>

Methods - Demographics

- **Subjects:**
  - 17 undergraduate students (Mixed In class/Online)
    - Boise (n=8)
    - Pocatello (n=9)
  - 14 undergraduate students (Fully Online)
    - Participated all online
- **Course:**
  - CSED 435L (Speech & Hearing Science Lab)

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Graphic Representation of the Research Design Schedule

<table>
<thead>
<tr>
<th>Lab 1</th>
<th>Lab 2</th>
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<tbody>
<tr>
<td>P1:</td>
<td>P1:</td>
</tr>
<tr>
<td>Y, X, Y, X</td>
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<tr>
<td>P2:</td>
<td>P2:</td>
</tr>
<tr>
<td>Y, X, Y, X</td>
<td>X, Y, X</td>
</tr>
<tr>
<td>B1:</td>
<td>B1:</td>
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<tr>
<td>X, Y, X</td>
<td>X, Y, X</td>
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<th>Lab 3</th>
<th>Lab 4</th>
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<td>P2:</td>
<td>P2:</td>
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<tr>
<td>Y, X, Y, X</td>
<td>X, Y, X</td>
</tr>
<tr>
<td>B1:</td>
<td>B1:</td>
</tr>
<tr>
<td>X, Y, X</td>
<td>X, Y, X</td>
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<tr>
<td>B2:</td>
<td>B2:</td>
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<td>X, Y, X</td>
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</table>

<table>
<thead>
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<th>Lab 5</th>
<th>Lab 6</th>
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<td>X, Y, X</td>
</tr>
<tr>
<td>P2:</td>
<td>P2:</td>
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<tr>
<td>Y, X, Y, X</td>
<td>X, Y, X</td>
</tr>
<tr>
<td>B1:</td>
<td>B1:</td>
</tr>
<tr>
<td>X, Y, X</td>
<td>X, Y, X</td>
</tr>
<tr>
<td>B2:</td>
<td>B2:</td>
</tr>
<tr>
<td>X, Y, X</td>
<td>X, Y, X</td>
</tr>
</tbody>
</table>

**Key:**
- Y = Independent Variable
- X = Posttest
- V = Treatment
- X = No Treatment
- Treatment = The Web-based Lab
- Control = The traditional classroom Lab
Methods – Demographics (cont.)

Figure 1: Participant Age Groups. Note that the 18 to 25 year age bracket was considered to be “typical” of undergraduate students and is, therefore, represented as a block of students.

• Additional demographical information:
  – Type of students
  – Marital Status
  – Educational histories (including parental)
  – Experience with computers/internet
  – Computer/Internet use & preferences
  – Languages spoken (1 ESOL)

Methods – Course Design

• Pre/Post Tests
• Lectures
• Cadaver Labs (Guest Lecturer)
• Unit activities/ Lab exercises
• Influences on Pedagogy:
  – Dick, Carey, and Carey (2005); Gagné et al. (2005); and Morrison, Ross, and Kemp (2004)

Methods – Course Design (cont.)

Unit Example

Results – Descriptive Statistics

• Satisfaction Survey

<table>
<thead>
<tr>
<th>Questionnaire Statements</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Indifferent</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learned more online than in previous face-to-face courses</td>
<td>15%</td>
<td>30%</td>
<td>35%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>In this class I learned more online than the face-to-face lab</td>
<td>25%</td>
<td>50%</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Web-based instruction can be as effective as face-to-face</td>
<td>55%</td>
<td>40%</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>The benefits of online education outweigh deficits</td>
<td>65%</td>
<td>30%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I had difficulty using the technology online</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Materials/Instructions were presented clearly &amp; effectively</td>
<td>45%</td>
<td>55%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Results – Parametric Analyses

- Four main analyses were made:
  - Online vs. Face-to-face
  - Individual Lab Learner outcomes
    - Online vs. Face-to-face
    - Fully online vs. Mixed
  - Overall Course Learner outcomes
    - Taught vs. not taught

Results – Parametrics (cont.)

- Online vs. Face-to-face

Unit | DF | Type III SS | Mean Square | t value | Pr > F
---|---|---|---|---|---
Unit 1 | 15 | 0.08386563 | 0.08386563 | 4.407 | 0.0005
Unit 2 | 15 | 0.09537580 | 0.09537580 | 3.082 | 0.0076
Unit 3 | 15 | 0.00029412 | 0.00029412 | 0.141 | 0.8928
Unit 4 | 14 | 9.9200349E-6 | 9.9200349E-6 | 0.000 | 0.9722
Unit 5 | 15 | 0.00036667 | 0.00036667 | 0.173 | 0.8698
Unit 6 | 14 | 0.00875089 | 0.00875089 | 1.082 | 0.2123

Results – Parametrics (cont.)

- Online vs. Face-to-face

Respiration

<table>
<thead>
<tr>
<th>Unit</th>
<th>Modality</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=Online</td>
<td>92.7000</td>
<td>4.9900</td>
<td>81.0000</td>
<td>100.0000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2=In-class</td>
<td>78.4286</td>
<td>8.4035</td>
<td>65.0000</td>
<td>88.0000</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Phonation

<table>
<thead>
<tr>
<th>Unit</th>
<th>Modality</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=Online</td>
<td>93.7500</td>
<td>9.1613</td>
<td>80.0000</td>
<td>100.0000</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2=In-class</td>
<td>78.8889</td>
<td>10.5409</td>
<td>60.0000</td>
<td>90.0000</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Results – Fully online vs. Mixed

- Online vs. Face-to-face

Unit | DF | Type III SS | Mean Square | t value | Pr > F
---|---|---|---|---|---
Unit 1 | 16 | 0.00044308 | 0.00044308 | 0.173 | 0.8633
Unit 2 | 13 | 0.01350000 | 0.01350000 | 0.574 | 0.5769
Unit 3 | 16 | 0.11107692 | 0.11107692 | 1.520 | 0.1479
Unit 4 | 16 | 0.00103214 | 0.00103214 | 0.200 | 0.8520
Unit 5 | 16 | 0.27074444 | 0.27074444 | 3.421 | 0.0035
Unit 6 | 14 | 0.03288606 | 0.03288606 | 0.970 | 0.3497

Results

- Individual Lab Learner outcomes
  - Online vs. Face-to-face

<table>
<thead>
<tr>
<th>Unit</th>
<th>DF</th>
<th>Type III SS</th>
<th>Mean Square</th>
<th>t value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>7</td>
<td>0.07641722</td>
<td>0.07641722</td>
<td>2.419</td>
<td>0.0442</td>
</tr>
<tr>
<td>Unit 2</td>
<td>7</td>
<td>0.0847619</td>
<td>0.0847619</td>
<td>1.295</td>
<td>0.2669</td>
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<tr>
<td>Unit 3</td>
<td>7</td>
<td>0.09080000</td>
<td>0.09080000</td>
<td>1.460</td>
<td>0.1878</td>
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<tr>
<td>Unit 4</td>
<td>7</td>
<td>0.0781250</td>
<td>0.0781250</td>
<td>0.927</td>
<td>0.3898</td>
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<tr>
<td>Unit 5</td>
<td>7</td>
<td>0.12038571</td>
<td>0.12038571</td>
<td>1.285</td>
<td>0.2618</td>
</tr>
</tbody>
</table>
## Results

- **Overall Course Learner outcomes**
  - Taught vs. not taught

![Graphs showing data](image1)

## Discussion – Review of Findings

- **Q:** Is there a significant difference in laboratory performance based on the mode of presentation (i.e., web-based or traditional face-to-face) when measured through learner outcomes?
- **H:** The learner outcome scores of students in the web-based version of the course will be significantly greater than those of the students who took the traditional classroom-based model.

## Study Strengths & Weaknesses

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control for sampling error (self selection)</td>
<td>Small sample size</td>
</tr>
<tr>
<td>Randomization</td>
<td>Small subgroups</td>
</tr>
<tr>
<td>Counterbalanced</td>
<td>Lack of pretest = trouble</td>
</tr>
<tr>
<td>Control for Researcher and prior experience bias.</td>
<td>Loss of Unit 5 data</td>
</tr>
<tr>
<td></td>
<td>Lab component</td>
</tr>
</tbody>
</table>

## Discussion – Educational Impact

- Reach more people
- Address employment shortages
- Sound pedagogical principles are even more important to success of online learning.
- Online learning offers flexibility and increased access to powerful visualizations and tools
- Online may not be for everyone
- Learning new technology

## Discussion – Future Studies

- Same Design, large (n)
- Better control for outside learning
- Specific strategies
- Specific tools
- Drop out vs. retention rate
- More diversity of courses & sample groups

## Conclusion

- Gagné et al. (2005) provide this caution: "Because the Internet is such a powerful instructional tool, it must be subjected to the same development and implementation rules as traditional education and training; in other words, it requires good pedagogical practices and good instructional design" (p. 211).
References


References (cont.)


References (cont.)