Utilizing Collaborative Testing to Engage Nursing Students Improve Academic Achievement and Decrease Attrition

Theresa Hatten Jackson PhD, R.N.
Background of Problem

• Predicted shortage in nursing
  (U.S. Department of Labor, Bureau of Labor Statistics [USDOL, BOLS], 2013)

• Nationwide attrition rates in nursing programs
  • First year attrition - 20% to 42%
  • Overall attrition - 20% to 27%
• Literature shows collaborative learning is linked to student engagement (SE) and
  • SE is linked to academic success
    (Hake, 1998; Johnson, Johnson, & Smith, 1998; Johnson et al., 2007; Kuh, 2003; Prince, 2004; Redish, Saul, & Steinberg, 1997)

• Nursing lacks evidenced based research to select teaching strategies
  (Popkess & McDaniel, 2011)
Do nursing students who participate in a collaborative learning process:

1. Attain high levels of academic achievement?
2. Report high levels of student engagement?
3. Have low attrition rates?
Bandura’s Triadic Reciprocal Model

Person

Behavior

Environment

(Zimmerman, 1989)
Literature Review

- Nursing Students
- Collaborative Learning
- Attrition
- Academic Achievement
- Student Engagement
Methods

• Research design
  – Quasi-experimental after-only nonequivalent control group design.

• IRB approval

• Setting
  – Appalachian region Southern Ohio
Methods (Cont.)

• Sampling plan
  – Non-probability convenience sampling
  – G*Power analysis to determine sample size
    • 128 participants
      (Faul, Erdfelder, Lang, & Buchner, 2007)
  – Eligibility criteria
    • Inclusion
    • Exclusion
• Instrumentation used included:
  – Survey of Student Engagement (SSE) (Ahlfeldt, Mehta, Sellnow, 2005)
  – Health Education Systems Incorporated
    – Specialty Exams (HESI-SE)
    • Fundamentals
      – Fundamentals course
    • Psychiatric mental health (Zwighaft, 2013)
      – Behavioral health course
Procedure

• Data Collection
  – Control and experimental groups
    • Gender
    • Admission scores
    • Age
Control and experimental groups

– Students were enrolled in either a
  • Fundamentals
  • Behavioral Health

– 4 unit exams
  • HESI-SE
  • Survey of Student Engagement (SSE)
Procedure

• Experimental groups
  – Permanent groups of five to six students
  – Four unit exams
    • Same exam time as the control group
    • Redistributed the exam time
      – 75% individual
      – 25% group
Procedure (Cont.)

• Experimental Group
  – Collaborative Testing Process

• Exam day
  – Individual exam
  – Recorded answers on Scantron® forms
  – Faculty collected Scantrons®
  – Student’s gathered in their groups
  – Each group received one Scantron® form
  – Reviewed exam and answers
• Experimental Group
  – Collaborative Testing Process (Cont.)

• Faculty graded
  – Individual exams
  – Group exam

• Based upon the group score
  – Five percentage points
## Demographics

<table>
<thead>
<tr>
<th>Course</th>
<th>Control (Spring)</th>
<th>Experimental (Fall)</th>
<th>Percent in experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals (n=153)</td>
<td>83</td>
<td>70</td>
<td>45.8%</td>
</tr>
<tr>
<td>Fundamentals</td>
<td>37</td>
<td>43</td>
<td>53.8%</td>
</tr>
<tr>
<td>Behavioral health</td>
<td>46</td>
<td>27</td>
<td>37.0%</td>
</tr>
</tbody>
</table>
## Demographics (Cont.)

<table>
<thead>
<tr>
<th>Gender (n=153)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (n=120)</td>
<td>78.4%</td>
</tr>
<tr>
<td>Male (n=33)</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number per group using age classification</th>
<th>Traditional (under 25)</th>
<th>Non-Traditional (25 and older)</th>
<th>Percent Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>46</td>
<td>37</td>
<td>55.4%</td>
</tr>
<tr>
<td>Experimental</td>
<td>49</td>
<td>21</td>
<td>70.0%</td>
</tr>
</tbody>
</table>
Research Hypothesis One

• Nursing students who participate in a collaborative learning process during unit exams will attain higher academic achievement than nursing students who do not participate in the collaborative learning process.
  – Analysis was performed
    • Rank un-pooled t-test
    • Logistic regression
# Fundamentals or Behavioral Health

**HESI-SE**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Groups</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Test statistic</th>
<th>Probability-value (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td>777.38</td>
<td>143.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td>795.33</td>
<td>138.68</td>
<td>-0.78</td>
<td>0.43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Courses</th>
<th>Fundamentals</th>
<th>Groups</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Test statistic</th>
<th>Probability-value (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>746.73</td>
<td>166.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td>801.35</td>
<td>156.65</td>
<td>-1.50</td>
<td>0.14</td>
</tr>
<tr>
<td>Behavioral Health</td>
<td></td>
<td></td>
<td>803.16</td>
<td>117.43</td>
<td>0.65</td>
<td>0.52</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>785.74</td>
<td>106.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td>785.74</td>
<td>106.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Fundamentals/Behavioral Health Groups

<table>
<thead>
<tr>
<th>Fundamentals Variables</th>
<th>B</th>
<th>Wald (z-ratio)</th>
<th>Odds Ratio</th>
<th>p-value</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>-0.748</td>
<td>-1.094</td>
<td>0.473</td>
<td>0.274</td>
<td>0.111</td>
<td>1.701</td>
</tr>
<tr>
<td>Non-traditional control</td>
<td>2.561</td>
<td>2.682</td>
<td>12.959</td>
<td>0.007</td>
<td>2.292</td>
<td>109.972</td>
</tr>
<tr>
<td>Non-traditional experimental</td>
<td>2.448</td>
<td>2.485</td>
<td>12.001</td>
<td>0.013</td>
<td>1.875</td>
<td>102.110</td>
</tr>
<tr>
<td>Traditional experimental</td>
<td>1.614</td>
<td>1.924</td>
<td>5.023</td>
<td>0.054</td>
<td>1.137</td>
<td>35.591</td>
</tr>
<tr>
<td>Rank score</td>
<td>0.010</td>
<td>0.404</td>
<td>1.010</td>
<td>0.686</td>
<td>0.960</td>
<td>1.062</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-2.572</td>
<td>-2.461</td>
<td>0.076</td>
<td>0.014</td>
<td>0.008</td>
<td>0.501</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioral health Variables</th>
<th>B</th>
<th>Wald (z-ratio)</th>
<th>Odds Ratio</th>
<th>p-value</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>-1.600</td>
<td>-1.945</td>
<td>0.202</td>
<td>0.052</td>
<td>0.029</td>
<td>0.850</td>
</tr>
<tr>
<td>Non-traditional Control</td>
<td>0.856</td>
<td>1.285</td>
<td>2.354</td>
<td>0.203</td>
<td>0.652</td>
<td>9.124</td>
</tr>
<tr>
<td>Traditional Experimental</td>
<td>0.076</td>
<td>0.103</td>
<td>1.079</td>
<td>0.918</td>
<td>0.246</td>
<td>4.619</td>
</tr>
<tr>
<td>Non-Traditional Experimental</td>
<td>0.184</td>
<td>0.213</td>
<td>1.202</td>
<td>0.832</td>
<td>0.200</td>
<td>6.449</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-0.724</td>
<td>-1.454</td>
<td>0.485</td>
<td>0.146</td>
<td>0.169</td>
<td>1.240</td>
</tr>
</tbody>
</table>
Review of the literature

– No studies were found using HESI-SE to measure academic achievement when collaborative testing was used
• Review of the literature (Cont.)

- Non-traditional students are more successful in course work and program completion than traditional students (Fraher, et al., 2008; Hadenfeldt et al.; Pitt, et al., 2012)

• This study non-traditional students were more likely to score 850 or higher on HESI-SE
Research Hypothesis Two

• Nursing students who participate in a collaborative learning process during unit exams will report higher levels of student engagement than nursing students who do not participate in the collaborative learning process.

• Analysis was performed
  – Wilcoxon rank sum test
  – Two-way analysis of variance
## Survey of Student Engagement Responses

<table>
<thead>
<tr>
<th>Course</th>
<th>Total scores: Survey and scales</th>
<th>Control (n=32)</th>
<th>Experimental (n=42)</th>
<th>Test statistic, W (Z)</th>
<th>Probability-value (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals</td>
<td>Survey student Engagement</td>
<td>41.0 (20.0)</td>
<td>40.0 (18.0)</td>
<td>687.5 (1.85)</td>
<td>0.870</td>
</tr>
<tr>
<td></td>
<td>Collaborative learning</td>
<td>14.0 (11.0)</td>
<td>15.0 (10.0)</td>
<td>642.0 (1.73)</td>
<td>0.744</td>
</tr>
<tr>
<td></td>
<td>Cognitive complexity</td>
<td>9.0 (10.0)</td>
<td>9.5 (8.0)</td>
<td>621.5 (1.67)</td>
<td>0.582</td>
</tr>
<tr>
<td>Personal skills</td>
<td></td>
<td>17.0 (18.0)</td>
<td>16.0 (10.0)</td>
<td>769.0 (2.07)</td>
<td>0.288</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Total scores: Survey and scales</th>
<th>Control (n=33)</th>
<th>Experimental (n=16)</th>
<th>Test Statistic (W)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral health</td>
<td>Survey student engagement</td>
<td>35.0 (23.0)</td>
<td>39.5 (27.0)</td>
<td>220.0 (1.09)</td>
<td>0.353</td>
</tr>
<tr>
<td></td>
<td>Collaborative learning</td>
<td>12.0 (11.0)</td>
<td>14.0 (12.0)</td>
<td>240.0 (1.19)</td>
<td>0.614</td>
</tr>
<tr>
<td></td>
<td>Cognitive complexity</td>
<td>10.0 (9.0)</td>
<td>10.0 (11.0)</td>
<td>175.0 (0.87)</td>
<td>0.056</td>
</tr>
<tr>
<td>Personal skills</td>
<td></td>
<td>14.0 (15.0)</td>
<td>14.5 (15.0)</td>
<td>262.0 (1.30)</td>
<td>0.974</td>
</tr>
</tbody>
</table>
Literature indicated nursing students perceive themselves as less engaged in interactive or student-centered pedagogies (Popkess & McDaniel, 2011)

- No statistical significance was found
  - Study supported findings in the literature
Research Hypothesis Three

• When controlling for age, first semester level one (fundamentals class) nursing students who participate in a collaborative learning process during unit exams will have lower levels of student attrition than level one nursing students who do not participate in the collaborative learning process.

• Analysis was performed
  – Chi-square
  – Logistic regression
# Fundamentals Courses
## Pass Rates Across Groups and Age Groups

<table>
<thead>
<tr>
<th>Course</th>
<th>Group</th>
<th>Pass</th>
<th>Fail</th>
<th>Percent passed</th>
<th>Percent failed (attrition)</th>
<th>Probability-value (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals (n=80)</td>
<td>Control</td>
<td>24</td>
<td>13</td>
<td>64.9%</td>
<td>35.1%</td>
<td>0.650</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>31</td>
<td>12</td>
<td>72.1%</td>
<td>27.9%</td>
<td></td>
</tr>
<tr>
<td>Traditional (n=56)</td>
<td>Control</td>
<td>14</td>
<td>9</td>
<td>60.9%</td>
<td>39.1%</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>22</td>
<td>11</td>
<td>66.7%</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>Non-Traditional (n=24)</td>
<td>Control</td>
<td>10</td>
<td>4</td>
<td>71.4%</td>
<td>28.6%</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>9</td>
<td>1</td>
<td>90.0%</td>
<td>10.0%</td>
<td></td>
</tr>
</tbody>
</table>
• Non-traditional students are more likely to pass nursing courses
  (Fraher, et al., 2008; Hadenfeldt et al.; Pitt, et al., 2012)
  – Control group
    • 60.9% Traditional students passed
    • 71% Non-traditional students passed
  – Experimental group
    • 66% Traditional students passed
    • 90% Non-traditional students passed
  – No statistical significance
Conclusion Research
Hypothesis Three (Cont.)

• Nationwide first semester attrition rates 20-42%
  (Fraher, Belsky, Gaul, & Carpenter, 2010; Peterson-Graziose, Bryer, & Nikolaidou, 2013)

  – Control group 35%
  – Experimental group 28%
  – No statistical significance
Collaborative testing results in an increase in students exam scores

(Centrella-Nigro, 2012; Eastridge, 2014; Molsbee, 2013; Peck, Stehle Werner, & Raleigh, 2013; Sandahl, 2009)

- Attributed to fact they received additional points
• Literature showed that students who pass a course based on points received when using collaborative testing

  – Typically complete the nursing program

  – Pass NCLEX-RN exam on first attempt  \(\text{(Molsbee, 2013)}\)

  – Seven students passed

  – Plan to approach IRB and follow the students
Significance

• Nursing Education
  – Study provides a higher level of evidence-based research
  – Nurse educators can use information to make informed decisions
Significance (Cont.)

• Nursing Practice
  – Gained experience
    • Working with teams and collaborating

• Nursing Research
  – Findings not statistically significant
  – Framework for future studies
Significance (Cont.)

- Public Policy
  - Research is costly and time consuming
  - Attrition is costly and time consuming
    - Universities loose fees
    - Students waste
      - Federal aid/loans/money
      - Time
• Public Policy (Cont.)
  – Policies need to be in place
    • Support faculty research related to attrition
  – State Boards of Nursing and accrediting bodies
    • Require that educational research be conducted in nursing programs
The End

Questions?

THANK YOU!!!
References


