A Comparison of Instructional Methods for an Undergraduate Nursing Health Assessment Course

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Introduction

- Flipped Classroom vs Traditional classroom
  - Flipped classroom ensures active and high-impact learning more closely related to clinical practice (Billings, 2016)

- Use of technology with virtual patient interaction
Flipped Classroom design as pedagogical tool to enhance learning through increased faculty and student engagement and individualized learning (Paterson, 2017; Smith, 2017; Rotellar & Cain, 2016)

Promote higher-order thought processes and reasoning skills in second language students (Kim, Park, Jang & Nam, 2017)

Some studies have shown no difference in grades or level of satisfaction but suggest that intensity of the course has a factor (Whilliwer & Lystad, 2015)

Students often resistant to change from traditional methods of instruction and sometimes find individual learning of content difficult without the face to face contact (Telford & Senior, 2017)

Virtual patient technology provides a comprehensive learning experience in a safe environment, engaging students to develop their assessment and documentation skills. The combination of flipped classroom design with virtual patient experience was shown to allow for a personalized learning experience that promoted higher-level learning (Lichvar, Headges, Benedict, & Donihi, 2016)
Background

- Studies completed in pediatric course for FNP program and pharmacy program demonstrated favorable outcomes and positive student and faculty satisfaction (Critz & Knight, 2013; Pierce & Fox, 2012)

- Two integrative reviews evaluating studies involving nursing education and flipped classroom design indicates flipped classroom promotes active learning with student engagement and self-efficacy. Student satisfaction scores were mixed and in some studies had an inverse relationship to improved performance. No studies done in undergraduate Health Assessment course (Presti, 2016; Njie-Carr, Ludeman, Lee, Dordunoo, Trocky, & Jenkins, 2017, Betihavas, Bridgman, Kornhaber, & Cross, 2015)

- Scoping review using five-stage framework Arksey and O’Malley indicates much indirect evidence of improved academic performance, student satisfaction with the use of the flipped classroom in nursing education but a lack of conclusive evidence regarding contribution to lifelong learning (O’Flaherty & Phillips, 2015)
Course Design

- **Health Assessment BS Nursing program**
  - Course focuses on the theory and development of physical assessment skills and health pattern evaluation skills that are essential to culturally sensitive clinical judgements, therapeutic interventions, and achievement of desired health outcomes across the lifespan.
  - 2 Hr weekly class (lectures, discussion, podcasts, online learning)
  - 2 Hr weekly lab with coordinated curriculum (videos, hands on practice)
  - Methods of Instruction: Lecture, Discussion, Videos, Hands on practice
• Learning outcomes
  • Integrate knowledge of anatomy and physiology into health assessment process
  • Build foundation for making sound ethical and clinical judgements rooted in collection and interpretation of assessment data
  • Perform health status assessments and physical examination using a variety of tools and techniques for the orderly collection and documentation of comprehensive assessment data
  • Adopt a holistic approach that acknowledges the individuality of clients from a cultural and lifespan perspective
  • Communicate effectively using therapeutic techniques when conducting a comprehensive health history
### Student Evaluation

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Evaluation Method</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shadow Health DCE</td>
<td>Modules 11 @ 2% ea; comprehensive @ 5%</td>
<td>27</td>
</tr>
<tr>
<td>Examinations (5 at 6% each, final @ 15%)</td>
<td>Multiple choice examinations</td>
<td>45</td>
</tr>
<tr>
<td>Head-to-Toe Physical Examination</td>
<td>“Live” performance demonstration</td>
<td>20</td>
</tr>
<tr>
<td>SLUMS Mental Status Assessment</td>
<td>Written assignment</td>
<td>3</td>
</tr>
<tr>
<td>Nutrition assignment</td>
<td>Written summary/reflection</td>
<td>3</td>
</tr>
<tr>
<td>Female Reproductive unit assignment</td>
<td>Blackboard quiz</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Item</td>
<td>Evaluation Type</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>Nutrition Assignment</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>St. Louis University Mental Status (SLUMS)</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Health History Module</td>
<td>Formative</td>
<td></td>
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<tr>
<td>Skin Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Head, Eyes, Ears, Nose, Throat Module</td>
<td>Formative</td>
<td></td>
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<tr>
<td>Neurologic Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Cardiovascular Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Focused Assessment: Chest Pain</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Pulmonary Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Focused Assessment: Cough</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Abdominal Module</td>
<td>Formative</td>
<td></td>
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<tr>
<td>Focused Assessment: Abdominal Pain</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Female Reproductive Module</td>
<td>Formative</td>
<td></td>
</tr>
<tr>
<td>Comprehensive Assessment Module</td>
<td>Summative</td>
<td></td>
</tr>
<tr>
<td>Final Head to Toe Demonstration</td>
<td>Summative</td>
<td></td>
</tr>
<tr>
<td>Exam 1</td>
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<tr>
<td>Exam 2</td>
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<tr>
<td>Exam 3</td>
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<tr>
<td>Exam 4</td>
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<td>Exam 5</td>
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<td>Final Exam</td>
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<td></td>
</tr>
<tr>
<td>Final Course Grade</td>
<td>Summative</td>
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</tbody>
</table>
Methodology

- Quasi Experimental Comparison Design
- 3 groups:
  - Traditional Lecture (Traditional group): in class lecture and individual technology-based virtual patient assignment at home
  - Flipped Class (Flipped/Traditional group): podcast prior to class and individual technology-based virtual patient assignment in class with faculty support
  - Flipped Class with fully integrated technology classroom (Flipped/Integrated group): podcast prior to class and group technology-based virtual patient assignment in class with faculty support
- Students registered for course section prior to assignment to groups
Methodology

- Assignments and exams identical between the 3 groups
  - Individual versus group completion
  - Participants consented to have their grades included in analysis
  - Assignments were graded by lab instructors
    - Inter-rater reliability
  - Exams were administered by course faculty
    - Par-Score multiple choice

- Course evaluations completed and reported in aggregate as per normal procedures
Sample

- Convenience sample, students enrolled in course
  - Course enrollment occurred prior to assignment of groups
  - Option to participate and study information provided by a faculty member not involved in the course

- Student body (college): 2,759 total UG students, 1,111 men & 1,648 women; average age 20.8 (17-71)
  - UG Nursing: 692 total students, 61 men & 631 women; average age 20.8 (17-57)
• Groups
  - Total n = 95
    - Traditional n = 28
    - Flipped/Traditional n = 34
    - Flipped/Integrated n = 33

• Course evaluations
  - Total n = 73
    - Traditional n = 19
    - Flipped/Traditional n = 25
    - Flipped/Integrated n = 29

• No comparison of demographics between groups was made
Data Analysis

- Faculty without course responsibilities collected student data
- Assignment grades were entered into a de-identified, password protected database
- Aggregate course evaluation scores provided by the college were compared
- Quantitative analysis completed using SPSS 24
  - Kruskal-Wallis
  - One-way ANOVA
- Qualitative analysis completed of open-ended responses on course evaluations
Data Analysis: Assignments

<table>
<thead>
<tr>
<th>Assignment</th>
<th>p value*</th>
<th>Type of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition Assessment</td>
<td>.001a</td>
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<tr>
<td>St. Louis Mental Status Exam</td>
<td>.002a</td>
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</tr>
<tr>
<td>HEENT Module</td>
<td>.000a</td>
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</tr>
<tr>
<td>CV Module</td>
<td>.000a</td>
<td>Formative</td>
</tr>
<tr>
<td>Neurologic Module</td>
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</tr>
<tr>
<td>Abdominal Module</td>
<td>.000a</td>
<td>Formative</td>
</tr>
<tr>
<td>Musculoskeletal Module</td>
<td>.000a</td>
<td>Formative</td>
</tr>
<tr>
<td>Focused Exam: Cough</td>
<td>.000a</td>
<td>Formative</td>
</tr>
<tr>
<td>Respiratory Module</td>
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</tr>
<tr>
<td>Health History Module</td>
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<td>Exam 5</td>
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<td>Formative</td>
</tr>
<tr>
<td>Comprehensive Assessment Module</td>
<td>.000a</td>
<td>Summative</td>
</tr>
</tbody>
</table>

* p < .05; a = Kruskal-Wallis, b = ANOVA
Data Analysis: Assignments

- In formative assessment, the:
  - Flipped/Integrated group significantly outperformed both the Traditional & Flipped/Traditional groups on the Nutrition Assessment, & HEENT, CV, Abdominal, Musculoskeletal, & Focused Exam: Cough Modules
  - Flipped/Integrated group significantly outperformed the Traditional group on the St. Louis Mental Status Assignment & Exam 5
  - Flipped/Integrated group significantly outperformed the Flipped/Traditional group on the Neuro, Respiratory, & Health History Modules
  - Flipped/Traditional group significantly outperformed the Traditional group on the St. Louis Mental Status Assignment
  - Traditional Group significantly outperformed the Flipped/Traditional group on the CV module

- In summative assessment, the:
  - Flipped/Integrated group significantly outperformed both the Traditional & Flipped/Traditional groups on the Comprehensive Assessment Module
Data Analysis: Course Evaluations

▪ One item on course evaluations demonstrated significant differences between groups
  ▪ “I learned a lot in this class” (p = .037; Kruskal-Wallis). The Flipped/Traditional group scored significantly lower than the Traditional group on post hoc analysis

▪ Qualitative analysis
  ▪ Students enjoyed: podcasts, lectures, slides, modules, in class quizzing, skill demonstration/lab work, group work, flipped classroom, interactive learning, lecture before lab
  ▪ Students did not enjoy: podcasts, modules, group work, flipped classroom
Few differences were noted in summative evaluation

For differences in formative evaluations, individual vs. group work on the modules may have influenced grades

Few differences in course evaluations
  - Some enjoyed flipped, some did not
  - Some students reported a perception that the design of the study had influenced the design of the course
  - In the future, recommend allowing students to self-select into flipped versus traditional lecture settings

Similar findings to prior study using virtual technology and flipped classroom design with non-nursing students and prior studies in nursing education using flipped classroom design
  - Enhanced learning
  - Improved outcomes
Limitations

- Students not able to self select to which instructional format they desired
- Group vs. individual completion of assignments may have influenced grades
- Small sample size and generalizability concerns
- Assurance of inter-rater reliability in grading
In formative assessment, students in the Flipped/Integrative group outperformed their counterparts on 10 of 19 assignments.

- Few differences between Flipped/Traditional and Traditional Setting.

In summative assessment, no difference was detected between groups in 3 of 4 assignments.

Student perception of the course design was mixed.

Further research is needed:

- Larger sample size with longitudinal design
- Impact on clinical performance and future courses
- Comparison when students self-select into a particular design


