Evaluating the Effectiveness of Two Teaching Strategies to Improve Nursing Students Knowledge, Skills and Attitudes in Quality Improvement and Patient Safety

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Disclosure and Objectives

- Karen Maxwell, EdD,RN-BC, Mercer University. The author has nothing to disclose.
- 1. Discuss the need to develop innovative teaching strategies to incorporate quality improvement and safety into nursing curricula
- 2. Discuss the use of the IHI Open School courses to teach quality improvement and safety
- 3. Compare the use of online learning versus online learning in conjunction with a flipped classroom on nursing student's knowledge, skills, and attitudes of quality improvement and safety

Problem

- At the end of Phase III of the QSEN Project (February, 2009-February, 2012)
  - Large group of faculty had never heard of the QSEN competencies
  - A need to develop easy and innovative teaching strategies to help incorporate quality and safety education into nursing curricula.

Purpose

- Evaluate effectiveness of two teaching strategies
  - Online modules in conjunction with a flipped classroom discussion seminar
  - Online modules only
- Quality Improvement and Patient Safety
  - Knowledge
  - Skills
  - Attitudes

Research Questions

- Is there a significant difference in pre-licensure nursing student's knowledge of quality improvement as measured by test scores based on type of educational program on quality improvement (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?
- Is there a significant difference in pre-licensure nursing student's knowledge of patient safety as measured by test scores based on type of educational program on patient safety (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?

Research Questions

- Is there a significant difference in pre-licensure nursing student's attitudes about quality improvement as measured by self-reported attitudes scores based on type of educational program on quality improvement (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?
- Is there a significant difference in pre-licensure nursing student's attitudes about patient safety as measured by self-reported attitudes scores based on type of educational program on patient safety (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?

Research Questions

- Is there a significant difference in pre-licensure nursing students comfort with skills of quality improvement as measured by self-reported skill scores based on type of educational program on quality improvement (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?
- Is there a significant difference in pre-licensure nursing students comfort with skills of patient safety as measured by self-reported skill scores based on type of educational program on patient safety (online modules in conjunction with a flipped classroom discussion seminar vs. online modules only)?

Ethical Consideration

- IRB approval was obtained from the participating university and The University of Alabama.
- Permission was obtained from the dean of the college of nursing to utilize students
- Permission was obtained from the dean of the undergraduate program to randomly assign students to the experimental and control groups

Methodology

Pretest/Posttest Control Group

- Quantitative
- **Experimental Randomized Pre-test-Posttest Control Group Design**

Experimental group	**R**	O_1	**X**	$\mathbf{O_2}$
Control group	**R**	O_1	**C**	$\mathbf{O_2}$

Sample and Setting

- Setting: Private University setting in the Southeastern United States
- Sample: Convenience sample of pre-licensure baccalaureate nursing students
  - Target 134 senior level pre-licensure baccalaureate nursing student
  - Leadership and Role Practicum Course
    - 97 consented
    - 79 completed pre-test (37 experimental group, 42 control group)
    - 64 completed both pre-test and post-test (31 experimental, 33 control group)
- Access: Researcher is a Faculty member at University

Sampling Procedure & Randomization

- Prior to consent
- Alphabetical list of students
- Each student given a number arbitrarily
- Research Randomizer
  - 2 sets of 67 unique numbers
    - Experimental group
    - Control group

Recruitment

- Students received a recruitment letter
- An Intermediary
  - Explained the study
  - Answered students questions
  - Had students sign a consent form
  - Each student who consented received a light up pen ~$1.50

Overview of the Intervention

Experimental Group

Phase I

- Pre-test

- **Phase II**
  - Completed 10 online modules through the IHI Open School
  - Completed 8 week 2 hour flipped classroom discussion seminar

- **Phase III**
  - Post-test

Control Group

- **Phase I**
  - Pre-test
- **Phase II**
  - Completed 10 online modules through the IHI Open School

- **Phase III**
  - Post-test

IHI OPEN SCHOOL WEBSITE

- IHI Open School

Watch this fun animated whiteboard video from Dr. Mike Evans and IHI, which introduces some history and concepts of health care quality improvement »

An Illustrated Look at
QI in Health Care

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QUICK LINKS

- Take a Course
  - Español / LAC Group

INTEGRATION

MOBILE APP

PRACTICUM

Quality Improvement

- QI 102: The Model for Improvement: Your Engine for Change
- QI 103: Measuring for Improvement
- QI 104: The Life Cycle of a Quality Improvement Project
- QI 105: The Human Side of Quality Improvement
- QI 106: Mastering PDSA Cycles and Run Charts

Safety

- PS 102: Human Factors and Safety
- PS 103: Teamwork and Communication
- PS 104: Root Cause and Systems Analysis
- PS 105: Communicating with Patients after Adverse Events
- PS 106: Introduction to the Culture of Safety

Sample Lesson

Lessons

Status	Lesson
Completed	Lesson 1: Root Cause Analysis Helps Us Learn from Errors
Completed	Lesson 2: How a Root Cause Analysis Works
Completed	Lesson 3: How Root Cause Analysis Can Help Improve Health Care

Institute for Healthcare Improvement

THIS CERTIFICATE IS AWARDED TO

Karen Maxwell

for participating in the educational activity entitled

Root Cause and Systems Analysis

on

5/9/2012–2/2/2014

This continuing education activity carries 1.50 Contact Hours.

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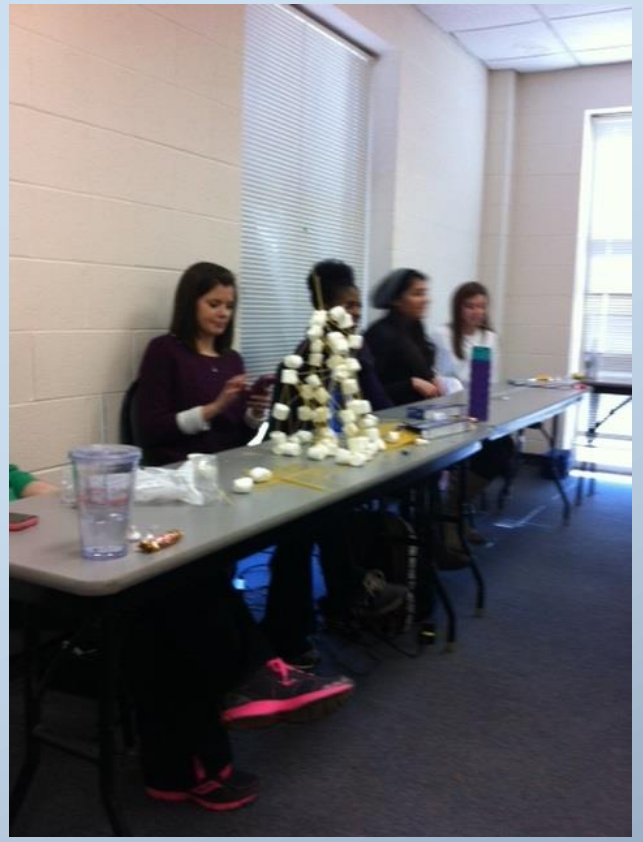
Maureen Bisognano
President and CEO
Institute for Healthcare Improvement

Flipped Classroom

Teamwork

Communication



Instruments

Quality Improvement Knowledge, Skills and Attitudes (QuISKA)

	Items On Original Instruments	Items on Adapted Instrument	Type of Items	Possible Range of Scores
QI Knowledge	QuISKA (7items) 1,2,20,21,22,23 27	QuISKA (6 items) 1,2,11,12,13,14,	Multiple Choice Correct Right/Wrong	0-100 Higher Scores better knowledge
QI Skill	QuISKA (15 items) 40,41,42,43,44,45 46,47,48,49,50,51 52,53,54	QuISKA (9 items) 15, 16,17,18,19,20 21,22,23	Likert 1-6 Novice to Expert	15-90 Higher score =greater skills
Quality Attitudes	QuISKA (3 items) 63,64,69	QuISKA (3 items) 24, 25, 26	Likert 1-4 Not important- High importance	3-12 Higher scores more positive attitudes

QuISKA & Healthcare Professional Patient Safety Assessment (HPPSACS)

Safety Knowledge Index	**QuISKA (8 items) 7,8,9,10,11,12 15,16 HPPSACS (5 items) 24,25,26,27,28**	**QuISKA (8 items) 3,4,5,6,7,8,9,10 HPPSACS (5 items) 61,62,63,64,64**	**QuISKA Multiple Choice Correct Right/Wrong**	**0-100 Higher scores greater knowledge**
Safety Skills Index	QuISKA (3 Items) 58,59,60 HPPSAC (5 items) 19,20,21,22,23	QuISKA (3 items) 31,32,33 HPPSACS 40, 50,51,52, 53	QuISKA Lickert 1-6 Novice-expert HPPSACS Likert 1-4 Not important- High importance	8-43 Higher scores greater skill
Safety Attitudes Index	QuISKA (1 item) 68 HPPSACS (18 items) 1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15, 16,17,18,19	QuISKA (1 item) 30 HPPSACS (18 items) 31, 32, 33, 34, 35, 36, 37, 38, 39,40, 41, 42, 43, 44, 45, 46, 47, 48	QuISKA Likert 1-4 Not important- High importance HPPSACS 1-5 Strongly disagree to strongly agree	19-94 Higher scores more positive attitudes

Content Validity

- 5 doctoral prepared nurse educator
- Rated instrument on a 4 point scale
  - 1=relevant, 2=somewhat relevant, 3= quite relevant, and 4=highly relevant.
- I-CVI-AVE was .97
  - .90 is acceptable lower limit
- S-CVI/UA was .83
  - .80 is acceptable lower limit

Data Analysis

Data Analysis

- Statistical Product and Service Solutions (SPSS)
- All test were conducted with alpha of .05
- Pre-test
  - Demographics
  - Independent Samples t-test
- Post-test
  - MANOVA
  - MANCOVA

Demographics

Table 4 Sample Demographics Data		
Demographic	Experimental Group	Control Group
Male	3	1
Female	28	32
Mean Age	29.03	25.12
Hispanic or Latino	2	2
Asian	4	2
Black or African American	5	8
White	22	23
None	13	20
Associate	4	1
Bachelors	14	11
Masters	0	1

Independent Sample t-test (pre-test)

Pretest	N	Mean	SD	df	$Mean_D$	t	Sig.
Age							
Experimental	31	29.03	7.927	62	3.91	(62)2.309	.024
Control	33	25.12	5.470				
Knowledge QI							
Experimental	31	.69	.2068	62	.0085	(62).177	.860
Control	33	.70	.1755				
Knowledge Safety							
Experimental	31	.67	.1243	62	.0569	(62)1.667	.101
Control	33	.61	.1470				
QI Skill							
Experimental	31	20.80	6.305	62	1.58	(62).908	.367
Control	33	18.96	6.993				
Safety Skill							
Experimental	31	22.06	5.35	62	0.83	(62)1.27	.207
Control	33	20.48	4.52				
QI attitude							
Experimental	31	11.25	1.063	62	0.19	(62).-.075	.941
Control	33	11.06	1.784				
Safety attitude							
Experimental	31	51.41	3.871	62	1.16	(62)-1.22	.225
Control	33	52.57	3.674				

Alpha Reliability Analysis

Table 6

Alpha Reliability Analysis

Tool	Number of Items	Cronbach's alpha coefficient
Skill of QI (QuISKA) N=9	9	.93
Skill of Safety (QuISKA) N=3	3	.91
Skill of Safety (HPPSACS) N=5	5	.90
Attitudes of QI (QuISKA) N=3 **Attitudes of Safety (HPPSACS & QuISKA)**	3 18/1	.60 .40

Knowledge, Skills & Attitudes of QI

- MANOVA
- There was a statistically significant difference between the experimental group and the control group.

F	p	Wilks Lambda	Partial eta squared	Observed power
(3,60)=3.236	.028	.86	.139	.716

Knowledge, Skills & Attitudes of QI

	Experimental Group	Control Group
Knowledge	M=.70, SD=.151	M=.62, SD=.201
Skills	M=29.00, SD=8.41	M=25.33, SD= 8.54
Attitudes	M=11.19, SD=.980	M=11.57, SD=.980

QI Skills

QI Skills Scale 1-6	Experiential Mean Score	Control Group Mean Score
Pie Charts	4.06	3.73
Graphical Representation	3.84	3.24
Collecting Data	3.55	2.94
Process Mapping	3.26	2.94
Histograms	3.13	3.03
Run Charts	3.06	2.45
QI Methodology,	3.00	2.48
Control Charts	2.94	2.36
Pareto Charts	2.16	2.15

QI Attitudes

Attitude QI Scale 1-4	Experimental Mean Score	Control Mean Score
Importance of teamwork in patient outcomes	3.97	3.94
Importance of performance measurement to patient outcomes	3.84	3.91
Importance nurses participation in QI projects	3.77	3.85

Knowledge, Skills & Attitudes of Safety

- MANOVA
- There was not a statistically significant difference between the experimental group and the control group.

F	p	Wilks Lambda	Partial eta squared	Observed power
(3,60)=1.30	.283	.939	.061	.330

Knowledge, Skills & Attitudes of Safety

- MANCOVA control for covariant of age
- There was not a statistically significant difference between the experimental group and the control group.

F	p	Wilks Lambda	Partial eta squared	Observed power
(3,59)=.652	.59	.968	.032	.179

Knowledge, Skills & Attitudes of Safety

	Experimental Group	Control Group
Knowledge	M=.73, SD=.108	M=.68, SD.157
Skills	M=25.77, SD=6.89	M=25.42, SD=6.58
Attitudes	M=51.58,SD=3.87	M=53.63, SD=7.61

Safety Skills

Comfort Skills of Patient Safety Scale (1-6)* or (1-5)**	Experimental Mean Score	Control Mean Score
68. Supporting a peer on how to respond to an error*	3.52	3.48
32. Root Cause Analysis**	3.45	2.91
31. Error Reporting Systems**	3.29	2.84
59. Disclosing an error to faculty*	3.32	3.76
56. Completing an incident report*	3.26	3.24
57. Analyzing a case to find cause of an error*	3.26	3.30
60. Disclosing an error to another healthcare professional*	3.26	3.48
33. Failure Modes & Effect Analysis**	2.42	2.39

Safety Attitudes

Attitude of Patient Safety Scale 1-5	Experimental Mean Score	Control Mean Score
41. Only Physicians can determine cause of an error	4.74	4.30
46. Faculty and staff communicate importance of safety	4.52	4.45
52. If I saw an error I would keep it to myself	4.32	4.21
51.If no harm to patient no need to report	4.29	4.30
39.Competent professional do not make errors	4.30	4.09
44. Learning how to improve safety	4.30	4.45
40. Healthcare professional should work to improve care	4.16	4.24
38. Making errors is inevitable	4.03	3.82
53. Most errors can't do anything about	4.03	3.79
48. Reporting systems do little to reduce error	3.81	3.36
36. How important is standardization of process to patient safety	3.58	3.81
55. Gap between best care and what is provided	3.45	3.45
49. Physicians should report errors to patient	3.42	2.88
50. Effective responses to error focus on personal involved	3.42	3.15
54. An effective strategy to prevent is work harder	3.19	2.73
47. Healthcare workers routinely report errors	2.81	3.00
45. Healthcare workers share medical errors and cause	2.71	3.09
43. Culture makes easy to deal with errors	2.65	2.85
42. Healthcare workers should not tolerate uncertainty	2.35	2.66

Results

Major Findings of the Study

- Online modules in conjunction with a flipped classroom discussion seminar.
  - Effective technique to improve knowledge and skills of QI
  - Effective technique to improve knowledge and skills of patient safety
  - Not effective in changing students attitudes of QI or patient safety
  - Consistent with previous research on:
    - Active learning
    - Use of Flipped classroom
    - Discussion Seminar

Major Findings of the Study

- Online Modules only
  - Effective technique to improve students knowledge of patient safety
  - Effective technique to improve students comfort with skills of QI & patient safety
  - Slightly effective in changing students attitudes of QI and patient safety
    - Limited research on nursing student's attitudes of QI and patient safety.

Limitations of the Study

- Limited Generalizability
- Small sample size
- Use of a new adapted tool
  - Low alpha reliability of the QI and safety attitudes scales

Implications for Nursing Education

- Online modules in conjunction with a flipped classroom discussion seminar is an effective teaching strategy
- Adapted QuISKA and HPPSACS tool
  - Use information to develop further educational programs
- IHI Open School Modules
  - Augment with further teaching
  - Enhance faculty development

Recommendations for Further Research

- Significant opportunities for future research on effective pedagogies to incorporate the QI and safety QSEN competencies.
- Build on results of the current study utilizing a larger sample size, multiple sites and more diverse population
- Conduct further research on the use of the flipped classroom in nursing education.
- Examine nursing faculty's current knowledge, skills, and attitudes of QI and safety.
- Further testing of the QuISKA and HPPSACS tools reliability

Contributions of the Study

- First known study to test the efficacy of IHI Open school courses
- Adds to growing body of research on effective teaching strategies to incorporate the QSEN competencies with their KSA's into the nursing curriculum