



Harnessing the Power of the Technological Pedagogical Revolution by Using Podcasts to Enhance Critical Thinking

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Background



- Critical thinking (CT) is essential for a nursing student's success (Myrick, Caplan, Smitten, & Rusk, 2011) and is vital nursing knowledge, regardless of setting or patient population (Kaddoura, 2010).
- CT can improve patient outcomes through the use of evidence-based practice; therefore, teaching CT in pre-licensure nursing education programs is necessary and enables nursing students to develop these skills through experience and practice (Chan, 2013).
- Research on the use of instructional technology, such as podcasting, as an adjunctive learning resource has shown that it is an effective teaching method and cost-effective.
 - Instructional technology is generally not utilized in nursing education.

Purpose & Significance



1. The technological pedagogical revolution holds great promise to a generation of learners who have matured alongside its emergence.
2. The NLN (2011) has set a research priority in nursing education to lead reform with the use of technology to disseminate knowledge.
3. The purpose of this pilot interventional study was to determine if use of a podcast for ongoing nursing education would increase critical thinking (CT).
4. The findings of this research provide guidance to educators throughout the nation regarding an innovative technological method to prepare and support nursing students.

Methods: Selection Criteria



- Convenience Sample
 - Participants were final semester students in their preceptorship in an urban, pre-licensure NLN-accredited state college nursing program
 - Control Group: Spring 2014 (n = 17)
 - Intervention Group: Fall 2014 (n = 21)



Health Sciences Reasoning Test (HRST)

(Cronbach's alpha = .78 and .82)

- CT skills measurement
- 5 Core Reasoning Skills
 - Induction
 - Deduction
 - Analysis
 - Inference
 - Evaluation



Control Group

- Spring 2014 students:
 - Pre-test administered at the beginning of the semester
 - Post-test administered at the end of the semester

Intervention Group

- Fall 2014 students:
 - Pre-test administered at the beginning of the semester
 - Free podcast access instructions provided to students
 - Post-test administered at the end of the semester

Methods: Statistics and Analysis



- Statistical analysis was conducted with IBM SPSS Statistical Software v22
- Between-groups repeated measures ANOVA was used to determine differences in CT (HSRT scores)
- Multiple linear regression (MLR) with full and restricted models were utilized to identify statistically significant covariates

Results: Participant Demographics



38 students participated in this study to its completion

- Control (C) = 17, Intervention (I) = 21
- Sex: 35 females (C = 17, I = 18); 3 males (C = 0, I = 3).
- Age range: 18 to 63+ years of age
 - Majority 26 to 42 years of age (n = 26)
- 19 received previous CT instruction
- Native Language:
 - 29 English (C = 14, I = 15)
 - 4 Spanish (C = 1, I = 3)
 - 1 Creole (C = 1, I = 0)
 - 2 Portuguese (C = 1, I = 1)
 - 1 Tagalog (C = 0, I = 1)
 - 1 Croatian (C = 0, I = 1)

Statistical Analyses: Hypothesis 1



Students who receive an educational podcast will have a greater increase for critical thinking ability than students who receive standardized education.

- Repeated Measures ANOVA
- Overall HRST Scores
 - $F(1, 36) = 1.91, p = .088, \eta^2 = .050$
 - Approaching statistical significance
- Individual core reasoning skills – no statistical significance
 - η^2 (Effect size) (low proportions of variance)

Table 1
Repeated Measures ANOVA for HRST Post-Test Scores and Core Reasoning Skills for Decision-Making Post-Scores and Educational Podcast Viewing: Intervention group (n=21)

Variables	F	p value	η^2
HRST Pre-Test	1.10	.151	.030
HRST Pre-Test and Group	1.91	.088	.050
Induction Pre-Scores	2.30	.138	.060
Induction Pre-Scores and Group	.853	.362	.023
Deduction Pre-Scores	1.82	.186	.048
Deduction Pre-Scores and Group	1.31	.261	.035
Analysis Pre-Scores	.062	.804	.002
Analysis Pre-Scores and Group	.636	.430	.015
Inference Pre-Scores	.508	.481	.014
Inference Pre-Score and Group	2.52	.121	.065
Evaluation Pre-Scores	2.41	.130	.063
Evaluation Pre-Scores and Group	.079	.781	.002

Approaching statistical significance

Statistical Analyses: Hypothesis 1



Means and Standard Deviations of HRST Scores Between Pre-test and Post-test Among Groups: Control group (n = 17) and Intervention group (n=21)

Variables	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
Control Group	19.65	4.05	19.47	4.46
Intervention Group	18.76	4.50	20.05	4.53
Total	19.16	4.27	19.79	4.45

Statistical Analyses: Hypothesis 2



Table 2
Full and Restricted MLR Models for Correlating the Relationships Between Number of Times Podcasts Viewed and HRST Post-Test Scores and Number of Times Podcasts Viewed and Core Reasoning Skills for Decision-Making: Intervention group (n=21)

MLR Models & Outcomes		B	SE	β	t	p
MLR Models for HRST Post-Scores						
1	(Constant)	7.14	3.246		2.2	0.04
	Pre-Test Scores	0.688	0.168	0.684	4.09	0.001
2	(Constant)	8.12	3.33		2.441	0.025
	Pre-Test Scores	0.697	3.327	0.693	4.17	0.001
	Total Times Viewed	-1.051	0.906	-0.193	-1.16	0.261
$\Delta F(1, 18) = 1.35, \Delta R^2 = .037, p = .261$						
MLR Models for Induction Post-Scores						
1	(Constant)	3	0.98		3.05	0.007
	Induction Pre-Scores	0.539	0.139	0.666	3.9	0.001
2	(Constant)	2.97	1.051		2.83	0.011
	Induction Pre-Scores	0.539	0.143	0.665	3.77	0.001
	Total Times Viewed	0.028	0.338	0.015	0.082	0.935
$\Delta F(1, 18) = .007, \Delta R^2 = < .001, p = .935$						
MLR Model for Deduction Post-Scores						
1	(Constant)	2.41	1.19		2.02	0.058
	Deduction Pre-Scores	0.674	0.215	0.583	3.13	0.006
2	(Constant)	2.88	1.24		2.33	0.032
	Deduction Pre-Scores	0.719	0.216	0.622	3.34	0.004
	Total Times Viewed	-0.641	0.516	-0.232	-1.24	0.23
$\Delta F(1, 18) = 1.54, \Delta R^2 = .052, p = .230$						
MLR Models for Analysis Post-Scores						
1	(Constant)	1.1	1.27		0.863	0.397
	Analysis Pre-Scores	0.651	0.337	0.367	1.93	0.065
2	(Constant)	-0.114	1.282		-0.089	0.93
	Analysis Pre-Scores	0.741	0.313	0.418	2.37	0.027
	Total Times Viewed	1	0.437	0.405	2.3	0.031
$\Delta F(1, 23) = 5.27, \Delta R^2 = .161, p = .031$						
MLR Models for Inference Post-Scores						
1	(Constant)	3.3	0.598		5.51	< .001
	Inference Pre-Scores	0.185	0.166	0.248	1.12	0.278
2	(Constant)	3.45	0.684		5.34	< .001
	Inference Pre-Scores	0.19	0.17	0.254	1.12	0.278
	Total Times Viewed	-0.151	0.311	-0.11	-0.485	0.633
$\Delta F(1, 18) = .235, \Delta R^2 = .012, p = .633$						

An increased dose (number of times viewed) will have a positive relationship on gains in critical thinking ability.

- Multiple linear regression
 - Full and Restricted Models
 - Overall no statistical significance
 - Core reasoning skill - Analysis subscale: statistical significance ($p = .031$)

MLR Models for Evaluation Post-Scores						
1	(Constant)	2.19	0.714		3.07	0.006
	Evaluation Pre-Scores	0.453	0.15	0.57	3.02	0.007
2	(Constant)	2.24	0.747		2.99	0.008
	Evaluation Pre-Scores	0.464	0.158	0.584	2.94	0.009
	Total Times Viewed	-0.09	0.292	-0.061	-0.307	0.762
$\Delta F(1, 18) = .094, \Delta R^2 = .004, p = .762$						

Note: Model 1 is the Restricted Model, Model 2 is the Full Model, ΔF is the F change, ΔR^2 is the R^2 change between Full and Restricted Models.

Statistical Analyses: Hypothesis 2



Means, Standard Deviations, and Multiple Regression Model for Correlating the Relationship Between Number of Times Podcast Viewed, HRST Scores, and Core Reasoning Skills for Decision-Making: Intervention Group (n=21)

Variables	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
Times Viewed = 0	19.27	4.941	21.67	5.203
Times Viewed = 1	19.00	4.967	19.00	4.359
Times Viewed = 2	18.88	4.224	19.75	4.449
Total	19.08	4.551	20.05	4.533

Statistical Analyses: Hypothesis 3



Table 3
MLR Models for Correlating the Relationships Between Specific Demographic Factors and HRST Post-Scores and Specific Demographic Factors and Core Reasoning Skills for Decision-Making: Intervention Group (n=21)

MLR Models & Outcomes		B	SE	β	t	p
MLR Models for HRST Post-Test Scores						
1	(Constant)	7.14	3.246		2.20	.040
	Pre-Test Scores	.688	.168	.684	4.09	.001
2	(Constant)	8.22	3.38		2.43	.026
	Pre-Test Scores	.678	.177	.674	3.840	.001
	Age	-.005	.459	-.002	-.012	.991
	Native Language	1.14	1.77	.116	.646	.527
$\Delta F(2, 17) = .218, \Delta R^2 = .013, p = .806$						
MLR Models for Induction Post-Scores						
1	(Constant)	2.59	.949		2.73	.010
	Induction Pre-Scores	.585	.131	.597	4.46	< .001
2	(Constant)	1.94	1.18		1.65	.107
	Induction Pre-Scores	.604	.136	.616	4.43	< .001
	Age	.116	.119	.134	.980	.334
	Native Language	.040	.107	.051	.368	.715
$\Delta F(2, 34) = .520, \Delta R^2 = .019, p = .599$						
MLR Model for Deduction Post-Scores						
1	(Constant)	1.91	.770		2.48	.018
	Deduction Pre-Scores	.711	.139	.647	5.10	< .001
2	(Constant)	1.76	1.05		1.68	.101
	Deduction Pre-Scores	.725	.144	.660	5.02	< .001
	Age	.056	.153	.048	.366	.717
	Native Language	-.070	.136	-.067	-.511	.613
$\Delta F(2, 34) = .209, \Delta R^2 = .007, p = .812$						
MLR Models for Analysis Post-Scores						
1	(Constant)	1.75	.795		2.20	.034
	Analysis Pre-Scores	.513	.212	.353	2.41	.020
2	(Constant)	1.10	1.00		1.10	.280
	Analysis Pre-Scores	.509	.216	.351	2.36	.023
	Age	.179	.140	.188	1.28	.208
	Native Language	.018	.134	.020	.134	.894
$\Delta F(2, 39) = .823, \Delta R^2 = .035, p = .447$						

There will be a relationship between demographic factors and changes in critical thinking ability for students who viewed an educational podcast.

- Multiple linear regression
 - Full and Restricted Models
 - Overall no statistical significance
 - Core reasoning skill - Inference subscale: approaching statistical significance ($p = .072$)

MLR Models for Inference Post-Scores						
1	(Constant)	3.03	.618		4.91	< .001
	Inference Pre-Scores	.236	.158	.241	1.49	.145
2	(Constant)	2.19	.779		3.74	.001
	Inference Pre-Scores	.286	.153	.292	1.87	.070
	Age	.092	.112	.128	.823	.416
	Native Language	-.218	.099	-.340	-2.19	.036
$\Delta F(2, 34) = 2.851, \Delta R^2 = .135, p = .072$						
MLR Models for Evaluation Post-Scores						
1	(Constant)	2.28	.661		3.44	.001
	Evaluation Pre-Scores	.428	.139	.458	3.09	.004
2	(Constant)	1.89	.825		2.29	.028
	Evaluation Pre-Scores	.421	.143	.450	2.94	.006
	Age	.114	.101	.169	1.13	.268
	Native Language	-.002	.092	-.003	-.022	.982
$\Delta F(2, 34) = .638, \Delta R^2 = .029, p = .534$						

Note: Model 1 is the Restricted Model, Model 2 is the Full Model, ΔF is the F change, ΔR^2 is the R^2 change between Full and Restricted Models.

Conclusion



- The results of this pilot study suggest that CT podcast viewing did not improve nursing students' CT abilities
 - However, the results of the repeated-measures ANOVA were approaching statistical significance and a Likert assessment showed that students valued podcast education for learning CT skills
- Demographic factors (age and native language) and sample size were limited resulting in a decreased observed power
- Future investigation is recommended with a larger sample size with diversification of demographic factors

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