

**BROWARD COMMUNITY COLLEGE
TEACHING/LEARNING COMMUNITY
CLASSROOM RESEARCH AWARD**

EVALUATION FORM

Please complete this form for the research project that you conducted for the T/LC award. This information will be reviewed in order to evaluate the effectiveness of your research. Your evaluation and supporting documentation will be posted on the T/LC Website. Use additional paper where necessary.

Note: Please submit this form and your supporting documentation within 30 days of the completion of your project to Staff Development via email or on a disk (in Word format). Send a hardcopy (and disk) of your project to the Staff Development Office, Downtown Center - Room 605.

Name: Donna L. Merolle

Date: 5/29/2003

Signature: _____

Research Title: "Use of Mastery Learning in an AS Nursing Program: Focus on Student Success and Knowledge Retention"

Project Completion Date: 5/6/2003

**Use of Mastery Learning in an AS Nursing Program:
Focus on Student Success and Knowledge Retention**

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ABSTRACT

First year nursing students enrolled in the LPN to RN online nursing tract were divided into two groups for NUR 1220 Gastrointestinal/Genitourinary Nursing. The purpose of the study was to compare the academic success rate of students enrolled in an online class that utilized the concept of mastery learning to the academic success rate of students who were taking the same online class which was not using the concept of mastery learning. The study further looked to see if knowledge retention was different between the two groups. Mastery Learning was defined as “Given adequate preparation, specific learning goals, sufficient learning resources, and a flexible time schedule, students can (with rare exceptions) achieve the desired competence at high levels of proficiency” (McGaghi, 1978).

A pretest was given to both groups prior to any course material which showed that there was no statistical difference in the knowledge of GI/GU nursing between the two groups.

The control group progressed through the online material and was tested at three points using 100 question multiple choice exams each time. A 65 multiple choice question cumulative final examination was also given. The test portion of the grade was determined by averaging the four test grades.

The experimental group progressed through the same online material but was tested on smaller chunks of material with each test having a varied number of test questions. The test questions were the same as the control group and both groups ended up with the same number of questions by the end of the course. If the student did not obtain a passing score of 73% they were remediated and then retested on the same content. This pattern followed for a total of two remediations and a maximum number of 3 attempts. Provisions had been made should a student fail on the third attempt, but all students in the experimental group did pass on any third attempt that was done.

Test scores were used to determine academic success. Analysis of the data showed that that the experimental group had a statistically significant greater academic success rate than students in the control group.

Eight weeks post completion of GI/GU, all student were again retested with a 50 question cumulative comprehensive test. It was determined that there was not a statistical difference in the post-test scores. The hypothesis that students who remediate would retain course content was not supported.

1. State the problem/idea you researched/examined.

For the purpose of this study Mastery Learning was defined as “Given adequate preparation, specific learning goals, sufficient learning resources, and a flexible time schedule, students can (with rare exceptions) achieve the desired competences at high levels of proficiency” (McGaghie, 1978). It was felt that LPN’s, who traditionally have had a high-failure rate in the face-to-face classroom, would be at even greater risk when placed in an online environment.

The questions that were explored in this study included:

1. Is the academic success rate greater for online LPN-RN nursing students enrolled in a class that uses a Mastery Learning approach, than online LPN-RN students enrolled in a class that does not use a mastery learning approach (i.e. traditional).
2. Is there a difference in the amount of course content retained (8-weeks post course) between the experimental group that used the mastery approach in comparison to the control group which did not use the Mastery Learning approach.

2. Provide a summary of the results of your research.

1. A 50 question multiple-choice pre-test was given to all students enrolled in NUR1220. Independent-samples t-test indicated that the traditional and the mastery learning experimental group *were not* statistically significantly different on their precognitive mean scores (control 29.62; experimental 29.66) (2-tailed 0.978) [Table 1].
2. Three 100 question multiple choice tests and one 65 question comprehensive final were administered to control group. Fifteen tests equaling 300 questions and one 65 question comprehensive final were administered to experimental group. The statistical analysis, using an ANOVA, determined that the mean scores for test 1 (0.142), test 3 (0.328), and comprehensive final (0.784) were not significantly different between the groups [Table 2].

An independent t-test on test #2 revealed the mean score of the experimental group (77.25) was higher than the control group (66.63) at a statistically significant level (0.002) [Table 3].

The overall finding indicated that the mean score of the experimental group (3.26) and the mean score of the control group (2.75) were significantly different (2 tailed 0.038). These findings support the hypothesis that students who are given multiple chances to remediate and opportunities to re-test will have a higher academic success rate than students who do not [Table 4].

3. A cumulative post-test, given eight (8) weeks after the completion of NUR1220, was given to both groups of students. Independent-sample t-test indicated that while the mean of the control group (39.5) was higher than the experimental group (36.8), it was not significantly higher (2-tailed 0.236). These findings did not support the hypothesis that students in the mastery learning experimental group would retain knowledge longer than students in the traditional online environment [Table 5].

3. Please describe the methods you used to evaluate the effectiveness of your project. Include any quantitative and/or qualitative supporting data.

- The frequency distribution of students enrolled in NUR 1220 (Gastrointestinal/Genitourinary) for term IIA, 2003 shows that initially there were a total of 31 student enrolled in two sections of GI/GU. The control group, students enrolled in a traditional format online class, had 19 (61.29%) students; the experimental group, testing based on a mastery learning approach, had 12 (38.70%).
- A demographic data sheet was collected to ascertain the characteristics of the sample (results available upon request)
- A pretest was given to all students enrolled in NUR1220 on the first day of class prior to any student receiving information regarding GI/GU nursing. The pretest consisted of 50 multiple choice questions that related to all parts of the GI/GU course.
- An orientation to the course was held and information given concerning the study. Student self-selected which group they wished to participate in. A signed consent was obtained.
- Students in the control group progressed through the course material and was tested a total of 4 times. Three tests were 100-multiple choice questions and one 65-multiple choice cumulative final. These test scores were averaged together and the test portion of the grade assigned based on the total number of test points.
- Students in the experimental group progressed through the same course material as the control group. They were tested more frequently and based on smaller chunks of material. If they did not pass the test with a 73%, they were given an individual remediation plan. This plan varied but usually included a reading assignment, as well as a written component. Once the remediation was done and checked by faculty, the student was then given another test for the second attempt. The 2nd attempt did not have the same questions as the first test, but was based on the same material. If student did not pass the test on the 2nd attempt, a second remediation plan was given. Part of the 2nd remediation plan included reviewing attempts 1 and 2 which required an appointment with course coordinator. The student was given one final attempt. The 3rd attempt consisted of questions taken from attempts 1 and 2. (Refer to Appendix A for study flow diagram)

- Of the 12 students in the experimental group, only 1 student (8.3%) went through all testing passing on the first attempt. Between the remaining 11 students, 23 remediation plans were written for module #1, 42 for modules #2 and 3, 26 for modules #4 and 5 (Tables 6, 7, 8). The total number of individualized remediation plans actually written was 91. An important point is that 11 (91.6%) students were still in the process of remediating at the end of the 8 week course and simply ran out of time. Had the course been longer, or the students more timely in their work, the number of remediation plans would have been even higher.
- The experimental group tests were set up to coincide with the control group so that a parallel analysis could be made. The same questions were used.

Control Group	Experimental Group
Test #1 = 100 questions	Tests 1-5 = 100 questions
Test #2 = 100 questions	Tests 6-10 = 100 questions
Test #3 = 100 questions	Tests 11-15 = 100 questions
Cumulative Final = 65 questions (15 of 65 questions were bonus points)	Cumulative Final = 65 questions (15 of 65 questions were bonus points)

- The effectiveness of this instruction (i.e. mastery learning) was measured by analyzing the cumulative test scores of the two groups. The control group (non-mastery) had a 73.68% passing rate with a “C” or better for the test portion of the course. In comparison, the experimental group had a test passing rate of 91.66%.
[note that all experimental students had attempted every test at least once. If they did not have time to remediate, the grade from the first or second attempt was counted].

4. If applicable, identify what prevented you from achieving maximum results.

- A. Original definition of Mastery learning stated that a “flexible time schedule” was part of the equation that would lend itself to a successful student. Unfortunately, nursing students are on a fast track where each nursing course is only eight weeks in duration. As the statistics showed, every student in the experimental group, with the exception of one, was still in the process of remediating up till the final day of the course. To fully evaluate the concept of mastery learning, students would need the freedom to remain in a course until the material was mastered and then move to the next. Since the nursing curriculum is very structured, this is not within the realm of possibility at this point.
- B. The class size (n= 31) was both a positive and negative factor. Because the sample was small, any conclusions or generalizations of the study should be done with caution. The fact that it was small class, however, allowed the course instructor to give specific, individualized remediation plans. It should be noted

that online NUR 1220 usually has 40-60 online students per session. Considering that 91 remediation plans were written for just 11 students, the labor intensive nature of the format is really prohibitive due to current size of most online nursing classes.

5. Please attach copies of any evaluation forms (or a summary of those forms) that you used?

No formal evaluations were collected from the students. On an informal basis the students were very discouraged at the number of remediation they had to do. They felt bogged down and frustrated. They voiced concern over the multiple trips to campus to take tests, re-take tests, and conferences. They also were very anxious that they would not be able to get through the material by the end of the course. A few felt that, while the mastery learning was a lot of work, they would not have made it though GI/GU under a traditional format.

6. Specifically, how do you intend to share the results of your classroom research with the BCC community?

Results of this study will be available through the Teaching/Learning Committee website. I will be willing to share results at nursing faculty meeting if so requested. I would be glad to share results with any faculty member that may be interested in this study. I can be contacted at 201-6781 or dmerolle@broward.edu

7. In what ways might faculty from other disciplines apply your research?

Since mastery learning can be applied to any classroom setting, it is my hope that by reading this research, other faculty may be encouraged to try it in theirs.

8. Other comments about your research that you wish to discuss with the T/LC or ideas for future follow-up studies in your discipline or other disciplines.

I wish to express my gratitude to the T/LC committee for encouraging me to find new ways to meet the educational needs of our students in the Center for Health Sciences. I think it's awesome that BCC, when traditionally community colleges do not place an emphasis on research, provides an avenue for interested faculty to pursue academic inquiries that adds to the knowledge base in our disciplines and helps the students we teach.

T-Test

→ Table 1: Pre-test Scores

Group Statistics

group	N	Mean	Std. Deviation	Std. Error Mean
pretest score Control	16	29.6250	3.5754	.8938
Experimental	12	29.6667	4.3135	1.2452

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
pretest score	Equal variances assumed	1.004	.326	-.028	26	.978	-4.167E-02	1.4911	-3.1067	3.0234
	Equal variances not assumed			-.027	21.141	.979	-4.167E-02	1.5328	-3.2280	3.1447

Oneway

Table 2: Test Scores

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Test 1	Between Groups	71.724	1	71.724	2.276	.142
	Within Groups	913.825	29	31.511		
	Total	985.548	30			
Test 3	Between Groups	53.165	1	53.165	.990	.328
	Within Groups	1556.706	29	53.680		
	Total	1609.871	30			
FINAL	Between Groups	8.632	1	8.632	.076	.784
	Within Groups	3272.917	29	112.859		
	Total	3281.548	30			

Note: Tests 1-5 (Experimental Group) is equivalent to test #1 (Control Group);
→ Tests 6-10 (Experimental Group) is equivalent to test #2 (Control Group); Tests 11-15 (Experimental Group) is equivalent to test #3 (Control Group)

→ Table 3: Test 2 Score

Group Statistics

group	N	Mean	Std. Deviation	Std. Error Mean
Test 2 Control	19	66.6316	9.1422	2.0974
Experimental	12	77.2500	7.2253	2.0858

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Test 2	Equal variances assumed	1.230	.276	-3.401	29	.002	-10.6184	3.1218	-17.0033	-4.2336
	Equal variances not assumed			-3.590	27.383	.001	-10.6184	2.9579	-16.6836	-4.5532

➔ **Table 4: Test Section - Final Grade**

Group Statistics

group	N	Mean	Std. Deviation	Std. Error Mean
total tests Control	19	3.2632	.6534	.1499
Experimental	12	2.7500	.6216	.1794

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
total tests	Equal variances assumed	.002	.962	2.169	29	.038	.5132	.2365	2.937E-02	.9969
	Equal variances not assumed			2.195	24.437	.038	.5132	.2338	3.106E-02	.9953

>> **Table 5: Post-test Scores**

Group Statistics

group	N	Mean	Std. Deviation	Std. Error Mean
posttest score Control	12	39.5000	3.9886	1.1514
Experimental	7	36.8571	5.3675	2.0287

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
posttest score	Equal variances assumed	.628	.439	-1.228	17	.236	2.6429	2.1514	-1.8961	7.1818
	Equal variances not assumed			-1.133	9.926	.284	2.6429	2.3327	-2.5599	7.8456

Table 6: Remediation Module 1

N=12

	Part 1	Part 2	Part 3	Part 4	Part 5
Passed with 1 st attempt	7 (58.33%)	11 (91.66%)	6 (50%)	7 (58.33%)	10 (83.33)
Passed with 2 nd attempt	2 (16.66%)	1 (8.33%)	6 (50%)	2 (16.66%)	1 (8.33%)
Passed with 3 rd attempt	2 (16.66%)			2 (16.66%)	
Did not/or did not have time to remediate	1 (8.33%)			1 (8.33%)	1 (8.33%)
Total	12	12	12	12	12

Module 1
Summary

Students who passed each module part on the first attempt	3 (25%)
Students who required a second attempt on one or more module parts	4 (33.3%)
Students who required a third attempt on one or more module parts	3 (25%)
Students who had time to remediate but did not or students that did not have time to remediate (course over)	2 (16.66%)
TOTAL NUMBER OF REMEDIATION PLANS	23

Table 7: Remediation Modules 2 and 3

N=12

	Part 1	Part 2	Part 3	Part 4	Part 5
Passed with 1 st attempt	3 (25%)	4 (33.33%)	11 (91.66)	6 (50%)	6 (50%)
Passed with 2 nd attempt	5 (41.66%)	2 (16.66%)		2 (16.66%)	5 (41.66%)
Passed with 3 rd attempt	1 (8.33%)	2 (16.66%)			
Did not/or had not time to remediate	3 (25%)	4 (33.33%)	1 (8.33%)	4 (33.33%)	1 (8.33%)
Total	12	12	12	12	12

Module 2 and 3
Summary

Students who passed each module part on the first attempt	2 (16.66%)
Students who required a second attempt on one or more module parts	3 (25%)
Students who required a third attempt on one or more module parts	1 (8.33%)
Students who had time to remediate but did not or students that did not have time to remediate (course over)	6 (50%)
TOTAL NUMBER OF REMEDIATION PLANS	42

Table 8: Remediation Modules 4 and 5

N=12

	Part 1	Part 2	Part 3	Part 4	Part 5
Passed with 1 st attempt	5 (41.66%)	5 (41.66%)	5 (41.66%)	7 (58.33%)	4 (33.33%)
Passed with 2 nd attempt	2 (16.66%)	2 (16.66%)	1 (8.33%)	3 (25%)	2 (16.66%)
Passed with 3 rd attempt	1 (8.33%)				1 (8.33%)
Did not/or had not time to remediate	4 (33.3%)	5 (41.66%)	6 (50%)	2 (16.66%)	5 (41.66%)
Total	12	12	12	12	12

Module 4 and 5
Summary

Students who passed each module part on the first attempt	1 (8.33%)
Students who required a second attempt on one or more module parts	1 (8.33%)
Students who required a third attempt on one or more module parts	1 (8.33%)
Students who had time to remediate but did not or students that did not have time to remediate (course over)	9 (75%)
TOTAL NUMBER OF REMEDIATION PLANS	26

Appendix A

