A COMPARISON OF TWO TYPES OF LEARNING EXPERIENCE IN A SECOND YEAR NURSING COURSE

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Nursing educators' interest in improving education has generated some innovative attempts in planning and implementing instructional methods in schools of nursing. Concerns about instructional strategies should remain central to curriculum development, implementation, and/or change. These concerns are directed toward what instructional methods to use, when to use them and how effective and efficient they are in the teaching-learning process. The first two aspects (what and when) might not be hard to pursue because there are a number of resources available for educators to review and utilize. In nursing education, however, evaluation of instructional methods as to effectiveness and efficiency is at a beginning level.

In most schools of nursing the evaluation process has been traditional in that it has emphasized the products of learning rather than the process of learning. The focus has been on how much students have learned as determined by their scores on appropriate paper-pencil tests.

Evaluation as broadly defined by Cronbach (1968) is the collection and use of information to make decisions about an instructional program. The program may be a set of instructional materials, instructional activities, or the educational experiences of a student. He established three types of decisions for which evaluation could be used. The one most relevant to this study is an evaluation for the purpose of course improvement, i.e., effectiveness and efficiency of materials and methods used for teaching purposes.

PROBLEM

At McMaster University School of Nursing, at the end of the student's second year in the program, a separate (Term III) six

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week period was implemented. During this time the teaching and learning of nursing concepts related to those patients with impaired sensory and motor functions had been taught in two courses. These two courses were listed in the calendar as "Concepts of Illness I" and "Science III."

"Concepts of Illness I" is made up of a core nursing class and actual clinical practice. "Science III" is neuro-anatomy and neurophysiology. In this paper, the former will be referred to as "clinical nursing" and the latter as "neuroscience."

The simulated patient as described by Barrows (1971) had been the method of instruction primarily used for both courses. However its effectiveness had not been evaluated in relation to other instructional methods in terms of the human, money and clinical resources required.

PURPOSES OF THE STUDY

The purposes of this investigative study were to determine:

1. If there were differences in learning outcomes when simulated patients versus paper problems were used as instructional methods.
2. Whether the gains students made in neurosciences and clinical nursing justify the special resources and effort on the part of students and faculty.
3. The validity of methods used to evaluate students with regards to Term III objectives.
4. Whether non-expert tutors impede student learning of neuroscience.

A post-hoc purpose (not in the original scheme) was to determine if there was a difference in the amount learned when the student was placed in an acute versus a chronic setting.

DEFINITION OF TERMS

For the purpose of this study the following terms were defined:

1. Simulated patient — An individual programmed to simulate an illness.
2. Paper problem — Paper and pencil simulations of illness.
3. Non-expert tutor — A nursing instructor whose area of expertise is other than neuroscience.
4. Learning outcomes — Attainment of knowledge, skills and attitudes related to the objectives for neuroscience and clinical nursing.

METHODOLOGY

The sample consisted of sixty-three second year nursing students at McMaster University.

A pretest was administered at the beginning of the course.

Using pretest scores, dyads were formed. Each dyad consisted of a student with a high score and a student with a low score. These dyads were then assigned to Group I (P_1), or Group II (P_2). In P_1 N = 32. In P_2 N = 31.

The instructional methods used for Group I (P_1) were:

1. Simulated patients followed by small group tutorials for neuroscience.
2. Simulated patients for clinical nursing classes.

For Group II (P_2) the instructional methods used were:

1. Simulated patients followed by small group tutorials for neuroscience.
2. Paper problems for clinical nursing classes.

A post-test was administered to both groups at the end of Term III.

Scores on the pretest — post-test and final marks (grades) received by the students in neuroscience and clinical nursing were used to measure learning outcomes. Scores on the pretest — post-test were used to measure student gains.

PRETEST-POST-TEST

1. *The Neuroscience Test* consisted of 100 multiple choice items selected on the basis of the course objectives. There were 100 items on both the pretest and post-test. Content validity was established by having the test items reviewed by individuals with expertise in neuroscience. The completed forms of the test were also reviewed by individuals with expertise in measurement and evaluation. To date the reliability of the test has not been determined.

2. *The Nursing Test* used had been designed by the Faculty of the School of Nursing, University of California, San Francisco.* This test presented the students with a description of a clinical problem arranged in its successive stages. The student was given information of the type usually available to a nurse and a list of actions she might take. These actions included data gathering, patient care, communication, environmental management, professional referrals and recording of data. Alternative choices of action were available. When the student had made a decision among the alternatives she indicated her choice; she then received immediate feedback on the consequences of the choice. Five scoring systems had been developed for the test. Three of the systems assessed the degree to which the student selected nursing actions correctly and efficiently. Another system

*Permission was received to use the test from Karen Clause, University of California.

TABLE 1
COMPARISON OF MEANS IN PERCENTAGES BETWEEN GRADES RECEIVED AND POST-TEST SCORES FOR THE TWO GROUPS

	P_1	P_2	t
Neuroscience			
Post-test	57.7*	54.6	1.38 n.s.
Grades	78.1	76.0	1.30 n.s.
Clinical Nursing			
Post-test	68.4	69.3	.36 n.s.
Grades	70.6	72.9	1.38 n.s.

*Mean score differs from Table 4 as all scores were included here; in Table 2 only paired data was usable.

categorized the items into simple, common and complex levels of decision making. Another assessed the outcome of decisions in relation to the value and risk involved. The fifth scoring system assessed the quality of clinical judgment. The reliability and validity of the scoring system, as reported by the developers, had been checked for test/retest reliability, reliability of scoring in free response sections and content validity. Content validity of the test was established by nursing and medical experts, current nursing and medical literature.

DERIVATION OF FINAL MARKS

Final marks in neuroscience were determined by adding a group mark and an individual mark. The group mark was based on group growth as described by Dimock (1972). The individual mark was based on a written assignment which assessed content, knowledge and the ability to apply this knowledge to neurological problems.

Final marks for clinical nursing were determined by rating the student's performance in the clinical settings. A clinical evaluation form* which had been adapted for Term III was used for student ratings. The behaviours upon which the students were rated to the terminal objectives for the B.Sc.N. program.

RESULTS AND DISCUSSION

As shown in Table 1 there was no significant difference in learning outcomes between the two groups P_1 and P_2 as measured either by the post-test scores or by final marks.

The difference between the two groups was that one group had simulated patients while the other had paper problems in their *clinical nursing* classes. This treatment did not make any difference to

*These forms were developed by the undergraduate nursing faculty at McMaster and are used throughout the four years.

TABLE 2

CORRELATION BETWEEN GRADES RECEIVED AND SCORES ON POST-TESTS FOR CLINICAL AND SCIENCE COMPONENTS

	Post-test in Clinical Nursing	Science GRADE*
Clinical GRADE	r = .23	r = .51
Post-test in Neuroscience	r = .09	r = .15

TABLE 3

SCIENCE GRADE*

"Individual" component of Mark vs. "Group" assigned component	r = .03

the amount learned by the two groups. However, since both of the groups were exposed to simulated patients in their *neuroscience* classes, the "no difference" observed should not be used as concrete evidence as to the effectiveness of simulated patient versus paper problems as teaching devices.

Table 1 also shows a close correspondence between the post-test scores and final marks in clinical nursing, but there is a disparity of approximately 20 points on the post-test scores and final marks in neuroscience. We might attribute this to the fact that on the neuroscience component, the the post-test questions may have been too difficult or the grading system for the neuroscience course was too liberal. However, the slight differences that do exist between P_1 and P_2, as reflected both in the test scores and the grades, are in the same direction.

In spite of the close means on the clinical component between post-test score and final marks received, the coefficient of correlation as shown in Table 2 is quite low (r=.23). The two instruments measuring the same student gave different results. Either one of the tests is unreliable or they are measuring different things. The relationship between the scores on the neuro post-test and the science grade is even lower (r=.15). Here again, one must suspect that different things are being measured.

When final marks in neuroscience and clinical nursing are compared, the coefficient of correlation is .09. This may suggest that the

TABLE 4
COMPARISON OF PRE AND POST-TEST SCORES IN NEUROSCIENCE AND CLINICAL NURSING

	Mean Scores in Percentages Pre-test		Post-test	Gain	t	Level of significance
Neuroscience	P_1	40.6	59.2	18.6	10.35	.0001
	P_2	40.3	54.4	14.1	10.45	.0001
Clinical	P_1	62.2	68.4	6.2	4.56	.001
Nursing	P_2	60.1	69.3	9.2	5.39	.001

initial post-test results were unreliable, but probably reflects the differences of what was being measured. This may be more desirable than scores which are highly correlated.

The disparity between r=.51 (within grades) and r=.09 (within tests) may be due to the fact that in assigning the grades, content and clinical application were less well segregated than they were in the post-test used for neuroscience and clinical nursing.

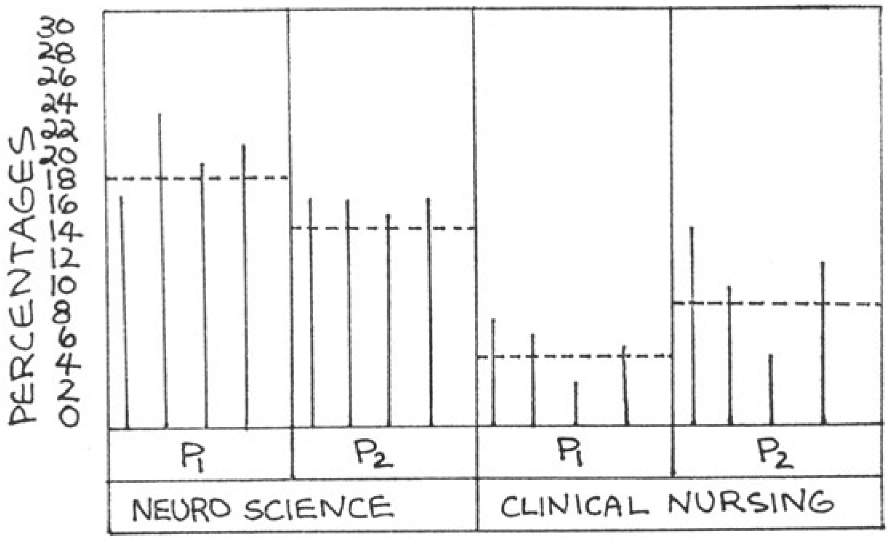
Table 3 shows that when the components of the science grades are compared on the same students, the coefficient of correlation is almost "0". In this instance since both components were supposed to measure learning outcomes in neuroscience the lack of a relationship is of concern and may in part explain the 20 point difference between the mean neuroscience grades and the mean test scores in Table I. Such a low coefficient of correlation suggests that the validity of the two methods used for measuring learning outcomes in neuroscience needs further exploration.

The study indicated that significant learning gains occurred in both neuroscience and clinical nursing (Table 4). Identical tests were used for pre and post measures so that some of this gain may have been due to familiarity with the tests. However, the six week time period between pre and post-testing would likely have limited this familiarity.

There were greater learning gains made in neuroscience than in clinical nursing. This leads to the question of whether *all* learning gains in clinical nursing were measured by the California nursing test. However, if the clinical nursing test did measure all the learning gains, one must question the value of providing such an extensive experience for a limited amount of achievement in clinical nursing.

The question, then, is whether the effort expended by faculty and students during the six weeks of Term III is justifiable in terms of gains. Since we lack any comparison data — measures of comparable gains given a different type of effort (programme) — this question

FIGURE 1
AVERAGE GAIN IN PERCENTAGES PER GROUP
FROM PRE TO POST-TEST



cannot be answered here on experimental grounds. Therefore, it is left to the judgment of the curriculum planners to decide whether the gains justify the resources required and the amount of effort expended.

A related question to benefits derived has been the concept of expert versus non-expert tutors. The question in the minds of faculty had been whether teachers whose expertise is outside of neurosciences can be effective facilitators in the learning of neuroscience by students. When questioned all tutors said they were non-expert in Neurosciences yet if one looks at Figure 1, one notes that in fact all groups gained more from pre to post-test in the sciences than in clinical nursing.

A question not originally asked but analyzed post-hoc was whether the setting in which the students were placed affected the outcomes.

Table 5 shows that according to the post-test score, it made no difference whether the students were in "chronic" or "acute" settings.

This "no difference" is to be taken with caution as the settings were not purely chronic or acute and often an acute case turns into chronic and vice versa.

SUMMARY AND CONCLUSIONS

Two types of learning experience for students in a second year nursing course were compared. Analysis of data suggests that the learning outcomes and students gains for both groups were similar.

The lack of ability to reach any conclusions regarding the differential effectiveness of simulated patients versus paper problems in

TABLE 5

COMPARISON OF SCORES FOR "CHRONIC" vs "ACUTE" GROUPS

	Mean Combined Scores (Clinical & Neuroscience Nursing)			
	Acute	Chronic	t	Sig.
P_1	62.	62.		n.s.
P_2	60.4	62.9	.98	n.s.
P_1+P_2	62.08	62.80	.47	n.s.

the teaching of Term III was due to the contamination of the treatment variables. It is suggested that if this question remains of interest, then the experiment should be repeated with care given to the segregation of treatment variables.

With regards to total benefits derived from Term III, it was suggested in the discussion section that this must be a subjective decision of the Faculty. If experimental support data is desired, we would suggest that alternate means of conveying the content and process information be instituted thus allowing for comparison of benefits derived.

The information obtained from the correlational analyses leads us to believe that in order to ensure a greater degree of validity of grades (that is, that the grades will truly reflect the students' abilities) multiple means of examining the students should continue. However care should be given to recognize which components are examined by which means, thereby assuring that the multiple measures reflect the multiple facets of learning outcomes.

Cumulative grades will then become a more valid representation of the students' ability.

The fact that student gains in neuroscience were not affected by how the tutors perceived their expertise is reassuring. It also leads one to question whether student gains would be the same whether "expert" tutors, non-expert tutors, or self instructional materials were utilized.

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