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Comparison of Written and Oral Examinations in a Baccalaureate Medical-Surgical Nursing Course

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Abstract

Topic Investigated:

Nursing students have traditionally been evaluated with an objective written examination. This method has demonstrated some benefits and disadvantages. This project examined the value of oral examinations in evaluating nursing students.

Methods:

Five groups of students were evaluated with different forms of testing. Some were evaluated with only written tests, others with only oral examinations, some with a combination of both types of evaluations.

Results:

Results demonstrated that oral examinations can effectively evaluate the student's comprehension and application of clinical information in a clinical situation, as shown in higher test results, compared with oral written examinations, and positive student comments.

Conclusions:

Oral examination can be as effective or more effective in evaluating student understanding of medical/surgical content and its application in clinical situations.

Key words: nursing student, examination, objective, oral

Comparison of Written and Oral Examinations in a Baccalaureate Medical-Surgical Nursing Course

Introduction:

At a large private university college of nursing, students have been evaluated for their comprehension of medical-surgical content with the traditional midterm/final objective written test consisting of multiple choice, matching, and true/false items. Continuing observation of this type of testing in one basic medical-surgical nursing course has demonstrated some benefits and difficulties. Therefore, the course instructor embarked on a project to determine the value of an oral examination, in comparison with the traditional objective written examination.

Theoretical Framework:

The goal of nursing evaluation is to determine if the nursing student is able to comprehend the information learned during study periods and taught during class work and apply that information in the clinical situation. The hope is to develop evaluation measures that will determine if such application is taking place. Bloom's taxonomy, as described by Slavin (2003), divides educational concepts into domains from simple to complex. These domains can be used to describe test items and types of tests into the ability of the test to actually evaluate student performance. The domains progress from knowledge (recalling information) through comprehension (translating or interpreting information), application (using principles or abstractions to solve novel or real life situations), analysis (breaking down complex information or ideas into simpler parts to understand how the parts relate or are organized), synthesis (creation of something that did not exist before), and evaluation (judging something against a given standard). The

traditional written objective examination often fits into the "knowledge" category. The hope for an evaluation measure would be to have it test at a level higher than knowledge, requiring better understanding and application of the material in a specific situation.

Hypothesis, Purpose, and Goals:

The primary purpose of this study was to compare the effectiveness of traditional objective written examinations and oral examinations in evaluating students' knowledge base in a basic medical/surgical nursing class. The study examined the effects of testing style on student learning by comparing test scores and examination of comments on student evaluations. The study hypothesized that oral examinations would result in:

1) More effective study habits and increased motivation to study information from the course content.
2) Improved learning and knowledge base, critical thinking skills, and ability to apply information in a specific clinical situation demonstrated by higher examination scores

Background Research Studies and Significance:

Describing the use of oral examinations in any setting was limited in the literature. Descriptions of their use in nursing settings were even more rare. **However, even though some of the following citations are older, they are felt to be helpful in an examination of this area of study.**

Balran and Farnsworth (1997) administered an oral examination twice a year in their course, the Sociology of Health. Students were video taped as they orally answered two questions. The grade was given after the instructor reviewed the videotape of the student's answer. Instructors noted that, though not statistically significant, the mean

scores for the oral examination were higher than the written examinations. Negative aspects of the process were student anxiety and nervousness. In spite of considerable time being given to prepare the students for this form of examination, instructors found the administration of such a test physically exhausting for the instructors when more than six students were scheduled consecutively.

Piane, Rydman, and Rubens (1996) studied learning styles of public health students in predicting a preference for taking oral or written examinations. They found learning styles did not predict preferences for oral or written examinations. The study, however, did not evaluate the value of each type of test in actual learning.

Mandeville and Menchaca (1994) used an elaborate two-part system that tested seven education students in a group environment. First, the students individually presented a concept they understood and had prepared, and were critiqued by the group. Second, students worked in two person teams. They were provided with a concept they presented without previous preparation. A second student critiqued them. The second student then presented another aspect of the same concept. The total examination took 108 minutes to administer to the entire group. Students were graded on a point system with points being determined by a combination of scores from two instructors, the members of the group, and the student being evaluated. The authors felt there were two limitations to their examination: 1) the situation may not be efficient for a larger group of students, 2) there may not be general acceptance of the form of examination as an accurate measurement.

In an older study at a school of pharmacy in North Carolina, Lindley, Mackowiak, Williams, and Hak (1986) instituted the use of oral examinations in a pharmacy course.

The student perceptions of such a testing method were favorable. Students felt the oral testing situation stimulated learning in the test preparation period, was fair in its administration, produced a manageable level of anxiety, and was a good learning experience. They felt oral examinations enhanced the value of the involved course. However, the impact of oral testing on the students' test grades or final class grade was not discussed.

According to Bashook (2000) oral examinations have been used to evaluate U.S. physicians since 1917. He states that, "Currently, 15 member boards of the American Board of Medical Specialties administer 17 different standardized oral examinations to approximately 10,000 physician candidates annually." Though variable scoring systems are used, the examinations consist of standardized cases or questions administered by examiners who are practiced in administering such examinations. Bashook notes, "The standardized oral examination is one potential way to measure the clinical judgment of professionals." As an example of such oral examinations, Solomon, Reinhard, Bridgham, Munger, and Starnaman (1990) describe the process of testing candidates in emergency medicine. The examination consists of cases provided by the candidates from their own practice in combination with cases provided by the examiner at the time of the examination.

Older nursing literature examined the advantages and disadvantages of objective written and oral examinations separately. Robbins (1975) noted that advantages of objective written examinations included rapid evaluation of the students' responses, uniformity of measurement resulting from clearly defined terms, and ability to test fully the information covered in the course. The biggest disadvantage was the need for

thorough validation of the test questions. Turner, Hillier, and Kershaw (1982) suggested that objective question validation should 1) demonstrate that test items measure what they are supposed to measure, 2) develop questions with a clearly defined answer, and 3) determine the discriminatory power of a question. They noted, however, the validation, though essential, is time consuming and monotonous. Marsden (1983) wondered if the objective written test was even worth keeping in terms of its ability to actually evaluate the ability to care for patients.

Comments on the value of oral or, at least, case oriented evaluations are available in the literature. Marsden (1983) suggested an alternative to objective testing of patient oriented case studies. He noted that such scenarios might indicate an understanding of the medical condition of the patient and needed nursing care, and would test the same knowledge content as that tested in objective testing. Dalis (1970) studied student achievement in health education subjecting one group of students to precise behavioral objectives and another to more vague behavior objectives. Results indicated learning was improved with precise behavior objectives, and students in the experimental group asked more questions during instructional sessions. These studies may lead to the notion that learning and knowledge application is improved with precise scenarios requiring the student to know and apply specific information.

At the college of nursing that participated in this study, students have traditionally been evaluated for their comprehension of medical-surgical content with the midterm/final objective written examination consisting of multiple choice, matching, and true/false items. Continuing use of this type of examination has demonstrated some benefits and difficulties.

Benefits:

1) Allows a broad sampling of knowledge in an objective fashion.
2) Can be easily scored and analyzed.
3) Can be easily administered to large groups with limited need for staff monitoring.

Difficulties:

1) Can be very time consuming to construct items that actually test the large amount of content. It may require an unmanageable number of items.
2) May represent highly subjective selections of questions. Content from some areas may not be tested at all.
3) Entails difficulty in writing unambiguous questions.
4) Rewriting items to eliminate numbers one and two above and to protect test security is very labor intensive.
5) Adequate studying is difficult, in light of the amount of content, but helping students focus their studying through a test preparation session may require extra meeting and study time.
6) Immediate feedback after the examination is difficult, sometimes impossible, since there is not always time to do a post examination review.
7) Coordination in putting the examination together, working with a testing center, and adjusting scores to reflect problems discovered during the examination review or as a result of answer sheet scanning can be labor intensive for faculty.

Johnson and Johnson (2002) noted some additional benefits and difficulties to objective tests.

Benefits:

1) Assessment of knowledge quickly and efficiently

2) Prevent bias in scoring

3) Measure student knowledge without bias toward writing, grammatical, or neatness skills.

Difficulties:

1) Rely on recognition and recall for assessment.

2) Require specific, predetermined answers

3) Penalize poor readers

With the above information, the course instructor felt that the case study method of both presenting content and examining understanding and application might have the advantages presented below. This method is more thoroughly described in the "Methods" section of this paper.

1) As with the objective written examination, oral tests would maintain the goal of encouraging students to learn and study by specific objectives
2) It should provide for consistent lecture/discussion/testing content from one block and semester to the next, while still allowing for updating of material as appropriate.
3) It would allow for evaluation of comprehensive course content in clinical situations, thus providing a real world environment.

4) It would provide for immediate evaluation of whether the students understand the information and can apply that information in a clinical situation.
5) It would eliminate the confusion and ambiguity that had been experienced with multiple choice questions.
6) It may not add to the workload of the students for study or preparation, but in fact, may decrease their workload by making clearer the content the students are responsible to understand.
7) It would decrease faculty workload by eliminating the need to revise test questions every semester, and by eliminating the need for pretest preparation sessions and posttest reviews. It would also eliminate the faculty time used to organize and coordinate testing.
8) It allows students to demonstrate their knowledge in more complex levels according to Bloom's taxonomy.

Description of Subjects:

This study viewed a collection of test scores in five groups of students enrolled in the fifth medical-surgical course of the nursing program. These are outlined below.

Group 1- 55 students- **The same group of students was given** 3 written midterms and one written final - Test average - 85

Group 2-150 students-1 written midterm and written final -Test average - 91

Group 3- 45 students-Oral examination only, no midterm-Test average - 99

Group 4- 92 students-1 written examination, 1 oral examination-Test average - 90

Group 5- 47 students- 1 written examination with questions resembling NCLEX examination questions, 1 oral examination-Test average - 92

All the students who participated in the study were at the same level of their nursing education and had the same type and amount of nursing student experience prior to enrollment in the course involved in this project. Testing was mandatory and test scores have been maintained as part of the instructor's permanent records. Test scores only have been presented in this paper, making the study participants anonymous.

Method or Procedure:

Students were divided into the following groups by convenience as changes to the testing procedure progressed from objective written examination to various forms of oral and/or objective written examinations combinations.

Objective Written Examination Only Group (Group 1 and 2)

Objective written examinations consisted of a midterm(s) and a final examination of multiple choice, matching, definition, and short answer questions. Several instructors contributed questions and graded their portions of the examination. **Efforts were made to design questions, which would test the students' ability to recall information, synthesize known information into separate concepts, and to apply information and concepts to clinical nursing situations (critical thinking). However, there was not time to validate questions in a non-testing arena prior to using them as an actual test question.** The examinations did not change between blocks (A block consists of six weeks of instruction. Two blocks equal one semester) within the same semester group. **However, since one of the objectives of testing is to evaluate students in the fairest manner possible,** changes were made to improve the examination questions between semester groups. These examinations of about 100 questions were taken in a testing

center, available over several days, and had no time limitations for the actual testing period.

Oral Examination Only Group (Group 3)

A test was designed consisting of nine case studies containing 132 questions. Questions were designed, again, to test the student's ability to recall information and to synthesize given information into separate concepts and to apply the information and concepts in clinical nursing situations (critical thinking). During the test design, a test key was written in which the significant content, concepts or application involved in each question were defined. Correct content, concepts or points of appropriate application were given a point value to allow the instructor to quantify the correctness of the student answer. At the beginning of the block the students were given the nine case studies and informed that it would be from these questions an examination question would be chosen. The students were informed of the examination design, and given six weeks to prepare. The examination was given in a faculty office, and were administered and graded by the same instructor. Each student chose one question from the 132 questions in the case studies out of a hat and had 10 minutes to respond. At the end of the 10 minutes, students were asked to determine the number of points they felt they earned **based on the test key**. A discussion between the student and instructor then followed to determine the final number of points given. This examination was given at the end of the course, and there was no midterm. Because the students had six weeks to prepare and were required to know the answers to all the questions, the single question answered was worth the same number of points previously given to both the midterm and the final, 250 points. It is interesting to note that students

in this class tended to deflate their grades when given the opportunity to evaluate themselves.

Oral Examination and Objective Written Examination Group (Groups 4 and 5)

The teaching team in which the study course was involved decided to increase the value of the examination portion of the final grade from 25% to 50% so final grades would more reflective of examinations than written work. The course instructor for the study group felt that it was a great deal of pressure on the student to increase the value of one examination from 250 points to 500 points, (50% of the 1000 point grading system). It was decided to have the student take a 250 point (125 question) objective written examination and a 250 point oral examination. The same set of nine case studies continued to be used as preparation for both the oral and objective written tests. This format was used for 18 months. However, at the end of this period, the study course instructor felt it was important to emphasize questions more consistent with the NCLEX examination in the course's written objective examination and efforts were made to replace old examination questions with new examination questions that would be consistent with this goal. Forty percent of the old examination questions were replaced with new NCLEX-type questions.

Cases and questions for all study groups were written from the objectives and the content areas presented in the course. All groups were given the benefit of a review period prior to taking whatever form of final examination was given that group. This content included pathophysiology and nursing care in the areas of oncology, hematology, GI, reproductive, genitourinary, cardiology, respiratory, endocrine, and neurology.

Concept areas were also addressed. These included diagnostic and lab tests, pharmacology, medical treatment, community and professional issues.

Statistical Analysis and Results:

A comparison of the study's examination method groups demonstrated a significant difference in the percentage of total possible points on examinations ($F_{4,385}$=58.88, p<0.0001), as well as in the comparison of final grade scores on a four point scale, A=4, B=3, etc ($F_{4,384}$=5.85, p<0.0001). Though the groups differed in the number of students, there were sufficient numbers in each group to obtain reliable estimates. The analysis controlled for varying numbers because standard errors are adjusted for sample sizes. The oral examination only group scored significantly higher (Table 1) than the other groups on the four point scale. There was no significant difference in the average grade for the other groups on this scale. This means that those students who only took the oral examination performed significantly better than those who took other types of examinations. The percentage scale showed no significant difference between the written objective examination and oral examination combination and the single mid-term with a final combination. All other groups were significantly different from each other (See Table 1).

Student Evaluation Comments

Both positive and negative comments on student evaluations were recorded. The negative comments were principally made about the written examinations. Students felt that cases did not prepare them for the objective written examination. The material they were expected to know was overwhelming, and a 125-question objective written test was too long. Students commented that they would have liked to have more short written

examinations throughout the block instead of one long one at the end of the semester. They felt that the single question oral examination at the end of the block was very stressful. Except for the stressfulness of the oral examination, all of the comments about the oral examination were positive. Students felt the cases helped them truly understand the material and provided practice in applying the material to clinical practice.

Student evaluations did not reflect the change in study habits. However, the principle investigator noted that the students formed study groups to research and share answers to the questions on the case scenarios. The groups determined which members would find answers to each of the nine cases and the groups gathered periodically to share and discuss those answers.

Limitations of this Study:

Limitations of this study include:

1) The inability to validate the questions in the objective written examination over time and with several student groups
2) The examination scores of the objective written examinations and the oral examinations are difficult to compare accurately given their inherent differences
3) The same instructor did all of the oral testing. Though that instructor attempted to be completely objective in evaluating the student answers, it was difficult.
4) **The manipulation of testing strategies and changes in test questions after the data collection began increases the difficulty of comparing data. However, the changes in the tests were made in an effort to more**

efficiently and fairly evaluate students' ability to learn and apply knowledge to a clinical nursing situation. Since this should be the main objective for any student evaluation measure, the limitation in comparison of study data is understood and accepted.

Discussion:

The initial hypothesis of this project was that oral examinations would result in:

1) More effective study habits and increased motivation to study information from the course content.
2) Improved learning and knowledge base, critical thinking skills, and ability to apply information in a specific clinical situation demonstrated by higher examination scores

More effective study habits were seen in preparing for the oral examination. Students not only studied individually, but also formed study groups with assignments to find the answers to specific questions and then shared that information with other members of the group. Though not stated as a specific goal of the project or anticipated as an outcome, students used these study groups to promote collegial exchange of real life situations by use of clinical case studies.

Improved learning, increased knowledge base, critical thinking, and application of information to clinical situations were noted through significantly higher examination scores with the oral examination than any other form of examination. Student comments noted that they felt oral examinations were beneficial, in spite of the time it took to study for the test and the stress the testing procedure produced. There was no comment from

students indicating that study for the oral examination took more time than studying for a written examination.

The oral examination seemed to be very stressful for some students, perhaps because the concept was new. Great effort was taken to discuss the test frequently with students. Faculty was available to answer any student questions about the examination and its content prior to the examination period. A review period was scheduled during class time to review the case studies with students and answer any questions students had not been able to answer on their own prior to the examination. In spite of these measures, all students were clearly concerned about having to orally present information to a faculty member in an examination situation, and two students were actually in tears when they came to their final situation.

As mentioned above, it was impossible for the faculty administering the oral final to be absolutely objective in grading the student. Having said that, however, it was absolutely clear to the faculty whether or not the student knew the information. With rare exception, students came prepared to answer the randomly chosen question in a complete and thorough fashion.

Professional role and community content is very difficult to test objectively, and has not been previously included in this course's written medical/surgical objective examination. In writing the case studies, however, content on community and professional roles was included. There was some question, however, about actually including the content in the examination period because it is often perceived as easier information to provide orally. It was decided, however, that if the information was

important enough to teach and ask in the case studies, it was important enough to teach and ask about in the examination situation.

As anticipated, oral examination was labor intensive for the faculty. The initial writing of the case studies took a great amount of time to be sure that questions were understandable and content objectives achieved. Since the case studies were not confidential, there was no need to change questions every semester, and once written, little revision was necessary. Since students were allowed, even encouraged to ask questions about the case studies, answering these questions, often on an individual basis, was time consuming. Finally, a review session was necessary prior to the actual examination period to answer questions students had not been able to previously answer, to review material students may have been unclear about, and to emotionally support students in their ability to use an unfamiliar examination format. The actual examination administration was very time consuming for the faculty. Since it was a research project, one faculty member took responsibility of administering all of the oral examinations. Even at only 10 minutes for each student, examination of 24 students took about 4 hours. This is probably not more hours than it takes to grade any test with a subjective or narrative component, however, no post test review was necessary since students already had their questions clarified and received immediate feedback about their test results.

In regard to the objective written examinations, changes in examination questions were frequently necessary, for several reasons. During the first years of this project, some faculty changed their questions to reflect new material and maintain confidentiality every semester. This was very time consuming and does not appear to have resulted in better test scores. During the final part of the project, replacing previous questions with

NCLEX type questions was time consuming and labor intensive. However, it did produce statistically significant improvement in test scores over any other type of objective written examination or objective written / oral examination combination. This may validate the fact that it is difficult for faculty to write and validate test items on a frequent basis. Standardizing items over a period of time may be helpful.

The actual statistical analysis seems to indicate that there is no difference between having one midterm, multiple midterms or only a final written examination in final examination scores or final grades.

Final grades were influenced by the written work students completed, in addition to test scores. Of 390 students in the study, 149 or 37% had final course grades not different from their examination grades. Seven students, 1%, had lower final course grades one grade lower than their examination scores because they did poorly on written assignments. Sixty two percent (N=244) of the students had final course grades higher (one to three grades higher) than their examination grades because their written work raised their final grade. After the examinations was changed to be worth 50% of the total grade, 86 students or 61% of that group (N=140) had grades that were higher than their test scores. One missing grade was reported. This was due to a student receiving an incomplete grade secondary to illness.

Conclusions:

- Oral examination can be as effective or more effective in evaluating student understanding of medical/surgical content and its application in clinical situations.
- Oral examination is labor intensive for faculty, but appears to be no more labor intensive for students than studying for the traditional objective written examination.

- Though oral examinations with a case scenario format are stressful for students, many commented they felt they learned significantly from this format and it appeared to be worth the stress.
- The standardization and validation of examination questions, as found in NCLEX examinations, produces improved scores on examinations.
- Multiple examinations in any of the combinations explored in this study did not produce better test scores. However, with a large enough sample of students, multiple examinations might prove to produce higher NCLEX scores than with fewer examinations.
- Final course grades may not correlate with examination grades if 50% or more of the grade is made up of other course assignments.

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TABLE 1
GROUP MEANS

	Four Point Scale for Final Grades		Percentage of Total Test Points Scale	
Group	N	Mean	N	Mean
Oral Only (group 3)	45	3.97*	45	99.09*
NCLEX/ Oral (group5)	47	3.87	47	91.98*
Written and Oral (group 4)	92	3.83	93	90.06#
Single Mid-Term with Final (group 2)	150	3.82	150	89.81#
Three Mid-Terms with Final (group 1)	55	3.81	55	84.40*

* Significantly different from all other groups at p<.05
# These two groups are not different from each other but are significantly different from other groups at p<.05

Response to critique

1.Is it a significant and original contribution to knowledge in the field?

Question about reliability of statistics will be dealt with under question 2.

2. Is the experimental design, methods, and results presented, compete, and soundly based?

It is unclear exactly what testing strategies were used in some areas. For example, it is difficult to determine what was meant by "3 written midterms and a written final" for Group 1. Did the same group of students take 3 examinations and a final or were there 3 groups taking one midterm and a final? See bolded print on page 11.

Groups consisted of varying numbers of subjects raising questions regarding the uniformity of groups and the strength of statistical analysis. The uniformity of the group is dealt with on page 12, paragraph 1. The statistical analysis is clarified on page 15 under the "Statistical Analysis" section.

There was manipulation of testing strategies and "frequent changes in test questions" after the data collection began leading to questions regarding the reliability of the data obtained for groups 1-4. This limitation is more fully explained on page 17.

It is unclear as to what specific criteria were used to make judgment regarding scoring for the "oral examination" group. Please note changes on page 13 under the oral examination group.

Testing of critical thinking was not defined. See bolded area on page 12.

Final grades used in the analysis, represented scores from course projects as well as scores from the various testing groups measured. This leads to significant questions regarding the differences in testing strategies along. This portion of the "Results" section has been rewritten to clarify the fact that testing scores alone were compared separate from the final grades. See page 15.

3. Do the author's conclusions logically flow from the data?

The conclusions may be affected by the reliability of the data as cited above. Data reliability has been dealt with under question 2.

4. Are the references pertinent, current, and in APA format?

Several articles cited are dated. The reason for this is clarified on page 5. The reference to Alverno College has been deleted.

5. Are illustrations and tables adequate in quality and number?

Table 2 does not differentiate between group differences. Table 2 has been omitted.