

Implementation of Mastery Learning in Nursing Education

Dionne Sutton Roberts, PhD, FNP-C; Racquel R. Ingram, PhD, RN; Sylvia A. Flack, EdD, RN; and Robyn Jones Hayes, MSN, ANP-BC

ABSTRACT

Mastery education has proven to be a useful strategy for improving student learning outcomes. However, few articles have described the use of mastery learning in nursing education programs. This article describes the implementation of mastery education in a nursing program and demonstrates how this approach was used to successfully increase National Council Licensure Examination® scores among diverse students. [*J Nurs Educ.* 2013;52(4):234-237.]

Mastery learning, also known as outcomes-based and competency-based education, has been successfully used in various disciplines to ensure student success. In general, the method promotes student success on the basis of preset criteria. These criteria are not based solely on students' academic ability but allow for flexibility in instruction and content. Mastery learning can thus be an integral component of a nursing program that admits diverse students. Mastery learning can enhance the academic performance of diverse students despite differences such as geographic location or ethnic and racial group. Because of its various components, mastery learning can be adapted for use in many disciplines. However, there is limited documentation on the use of this method to assure student achievement in nursing.

Background

In the traditional learning model, all students were given the same amount of time to learn, and the focus was on differences in ability. However, these basic characteristics of instruction changed in 1963 when John B. Carroll argued that student aptitudes actually reflect individuals' learning rates (Guskey, 1996). Carroll suggested that classroom instruction should place greater focus on the variable time required for different students to learn the same material.

In 1968, Benjamin Bloom developed what is now known as mastery learning. On the basis of his research, he concluded that if aptitude predicts student learning rate, then the extent of learning expected of a student can be set (Bloom, 1982). He also concluded that through mastery learning, instructors should be able to ensure that each learner achieves specified course objectives. Thus, the academic success of the student is based on instruction and not on student aptitude. The main disadvantage of instructional methods based on these learning theories is the time period needed to implement instructional methods to ensure that all students achieve the same level of learning (Bloom, 1982; Levine, 1985).

In nursing, the term *competency-based* is commonly used for mastery learning. The Institute of Medicine (2011) has emphasized the value of competency-based education because it can be linked to clinically based performance expectations, and it provides a foundation for decision-making skills to be used in all settings. The competency outcomes and performance assessment model has been used in nursing education to promote competency in practice (Lenburg, Abdur-Rahman, Spencer,

Received: August 30, 2011

Accepted: November 14, 2012

Posted Online: March 19, 2013

Dr. Sutton Roberts is Associate Professor, Division of Nursing, Dr. Ingram is Associate Professor, Division of Nursing, and Dr. Flack is Executive Director, Center of Excellence for the Elimination of Health Disparities, Winston-Salem State University, Winston-Salem; and Ms. Jones Hayes is Adult/Oncology Nurse Practitioner, Cone Health Cancer Center, Greensboro, North Carolina.

The authors thank Elizabeth Tornquist and Dr. Dennis Sherrod for their editorial assistance in the preparation of this article.

The authors have disclosed no potential conflicts of interest, financial or otherwise.

Address correspondence to Dionne Sutton Roberts, PhD, FNP-C, Associate Professor, Division of Nursing, Winston-Salem State University, F.L. Atkins Rm. 409, 601 S. Martin Luther King, Jr. Drive, Winston-Salem, NC 27110; e-mail: robertsd@wssu.edu.

doi:10.3928/01484834-20130319-02

Boyer, & Klein, 2011). The major concepts of the model are specific competencies, interactive learning strategies, objective competency-driven performance examinations, and final outcomes. In implementing this model, faculty must first determine the competencies needed for nursing practice. Second, faculty should identify effective interactive learning strategies to ensure comprehension. Finally, performance assessment methods must be established to measure competence and the achievement of outcomes. This conceptual framework has been effectively used in nursing programs and clinical agencies to develop competencies, evaluate the competency of nurses, and ensure patient safety in practice.

Redesigning the Curriculum

In 1989, our historically African American college and university nursing program came under fire by the state board of nursing, the state legislature, the university system's board of governors, and the university's board of trustees for its low enrollment and low National Council Licensure Examination (NCLEX®) pass rates. The nursing program had experienced years of low scores, interspersed with a few years of excellent scores. Having tried many strategies to improve quality, the faculty became exhausted and burned out. The nursing program was a target for negative media, not only local media but also statewide media. The university's board of governors threatened to close the nursing program because NCLEX scores had been below 75% for the previous 2 years.

In fall 1990, after studying mastery learning at a different institution and after extensive research of our students, faculty, curriculum, admissions criteria, and previous NCLEX scores, a new leadership team of our nursing program reported to the board of governors and the board of nursing that mastery learning would be used as a strategy to improve NCLEX scores. The team developed a mastery learning plan based on Nagel's and Richman's (1972) approach to competency-based (mastery) instruction. Nagel and Richman described competency-based instruction as a flexible and individualized program that allows students and instructors to work at their own pace without fear of failure. Those authors described four axioms underlying competency-based instruction. First, achievement is held constant while time varies. Second, competency-based instruction uses entry data, such as admission requirements, to design individualized learning opportunities that focus on exit requirements. Third, all student requirements are stated in an explicit manner. Finally, competency-based instruction involves a personalized dimension, which includes remedial opportunities.

Implementation of Mastery Learning

A backward curriculum design was used to implement mastery learning in the nursing program. The three steps of backward curriculum design are to (a) identify desired results, (b) determine acceptable evidence, and (c) plan learning experiences and instruction (Wiggins & McTighe, 2005). The desired result of the curricular revision was to improve NCLEX scores. The acceptable evidence of learning was the numeric grade of the course unit examinations and midterm examination. The benchmark for the course unit examinations and midterm examinations was 85%. Students had to achieve a prefinal grade

of 80% to be eligible to take the final examination. The third step—plan learning experiences and instruction—involved the process of mastery learning. The process used in the program, which is indicated in the Division of Nursing *Student Handbook* (Winston-Salem State University, 1990) involves:

- Identification of the competencies of professional nursing practice.
- Establishment of criteria to measure the competencies.
- Diagnosis of students' learning needs.
- Provision of a variety of experiences in different settings.
- Frequent assessments at stated intervals.
- Remedial activities.
- Evaluation of achievement of nursing competencies.

Mastery Learning Axiom One

Nagel's and Richman's (1972) axiom—achievement is constant and time varies—served as the basis for a strategy of repeating unit and midterm examinations, which was implemented in 1990. Initially, if a student did not pass the multiple choice unit and midterm examinations at an 85% level, he or she could repeat the unit examination three times until mastery was achieved. Ideally, with mastery learning the student will continue to test until mastery is achieved. Therefore, the nursing administration and faculty chose three attempts as the mastery number, thus decreasing faculty workload and the time constraints involved in preparing for an unlimited number of attempts. The instructor developed a new multiple choice examination for each retake but emphasized the same content. Then, after careful review of student data of course examinations, the National League of Nursing (2010) tests, and evaluation from faculty and students, the mastery level was changed to 80%, and it continues to be at this level currently.

With the system of three retests in place, the students complained they did not have enough time to study for the next course unit, and faculty encountered challenges with time constraints and the development of new test questions. Eventually, the retake number was reduced to two instead of three, and the retake for the midterm was eliminated. The tests are analyzed using *p* value and point biserial of each question to evaluate reliability and validity of the test. In addition, the retake number had subsequently been reduced to one due to faculty workload, time constraints, and concern for test security.

Mastery Learning Axiom Two

In 1990, consistent with Nagel's and Richman's (1972) second axiom, the division of nursing established entrance and progression requirements that were designed to yield success on the NCLEX. The majority population served at our university is African American, and students are diverse in geographical background, age, gender, life responsibilities, and academic levels and abilities. Considering this diversity, the faculty understood that there should not be only one set of admission requirements for all students. New admission requirements were established based on the examination of the correlation between NCLEX results and SAT® scores, end-of-course grades for general education courses, grade point average for the general education component, and final grades in science courses for nursing students. The admission requirements were designed for

different categories of students: traditional students, paramedic-to-baccalaureate nursing degree (BSN) and licensed practical nurse-to-BSN students, second-degree students, and, beginning in 2004, students in an accelerated BSN option. Currently, the division of nursing's student data suggest that the number of attempts of science courses and the critical reading score on the SAT are indicators for success in our nursing program. Recent changes in the admission requirements have supported those indicators.

Mastery Learning Axiom Three

According to Nagel's and Richman's (1972) third axiom, student expectations must be explicit. Our curriculum was designed first by developing end-of-program objectives based on the NCLEX test plan, the board of nursing standards, and the National League for Nursing (2010) standards. For students to achieve these objectives, level objectives were developed for each of the 3 years of the nursing curriculum. Courses were then developed from the level objectives, and unit objectives were developed from the course objectives. Included in the unit objectives are classroom, laboratory, and clinical enabling objectives. All objectives and requirements are clearly delineated in the student handbook, as well as in each course syllabus. The suggested learning activities for students to achieve the enabling objectives are clearly identified in these documents. For example, a unit objective in the health assessment course is: "Describe the use of inspection, palpation, auscultation, and percussion as physical examination techniques to use across the lifespan." One of the enabling objectives is: "Differentiate between light and deep palpation." The enabling objectives allow students to tailor their readings to the essential content rather than reading an entire chapter. Lectures and examinations are based on enabling objectives, and this allows students to know in advance what will be tested on examinations.

Mastery Learning Axiom Four

Consistent with Nagel's and Richman's (1972) axiom four, remedial sessions have been developed to provide students with opportunities to learn material before retesting. On the basis of test-item analysis, and prior to the multiple choice retake examination, group remedial sessions consist of reviewing content that 60% or more of the students did not master. In the group sessions, the faculty reviews all unit concepts missed by this percentage of students. Individual students who did not master the content are also encouraged to meet with the course faculty to design an individualized plan of study to master course concepts missed on the examination. In addition, students may attend a laboratory session or community health event to apply the didactic knowledge to clinical situations. These remedial activities are part of the personalized instruction provided by the program, and all are provided outside of class time.

Results

Comparison of the NCLEX scores since implementation and within the past 3 years shows that the strategy of mastery learning continues to be effective with our diverse student population. The 3-year (1991 to 1993) NCLEX scores immediately after implementation of mastery learning were 89%, 96%, and

85%, respectively (North Carolina Board of Nursing, 1977). The NCLEX scores from 2009 to 2011 were 91%, 86%, and 93%, respectively (North Carolina Board of Nursing, 2011). Currently, acceptable evidence of learning has been expanded to include clinical performance evaluation and Assessment Technologies Institute (ATI, 2013) test scores. The benchmark for unit examinations and the score eligible for taking the final examination have been eliminated based on student course evaluation, faculty evaluation of course data, and ATI test scores (comprehensive assessment and review program). Students must achieve a mastery score of 80% to pass the course.

Advantages and Disadvantages of Mastery Learning

The nursing program has seen a positive effect of mastery learning on student achievement, NCLEX scores, and feedback from the community and employers. As noted above, after implementation of this method in 1990, the NCLEX scores improved dramatically. Since 2004, the NCLEX scores have trended upward and have been competitive with those of similar institutions (North Carolina Board of Nursing, 2004).

One advantage of mastery learning in nursing is that students are provided with multiple opportunities to master content. Currently, if our students do not achieve 77% accuracy on the original examination, they are strongly encouraged to retake the examination. However, as noted above, students are provided with remedial activities between the original examination and the retake examination. The most common remediation strategy is to review with the class the content that the majority of the students missed. Also, open laboratory sessions have been implemented to assist students with improvement of the nursing skills needed for the clinical setting. In addition, students receive extensive exposure to NCLEX-type questions. With mastery learning, faculty have also seen increased confidence in students taking NCLEX-type questions on the ATI tests, the retake examinations, and on the NCLEX itself.

However, there are also some disadvantages to mastery learning. For example, some students tend to view mastery learning as simply a way to retest on the same content. Therefore, they tend to study for the retake examination but not for the original examination. On the other hand, taking the original examination exposes students to test questions and guides them to the specific areas on which they need to focus.

In addition, nursing faculty have concerns about the amount of time involved in test development and grading. It also requires additional time to reinforce content. This is sometimes challenging for nursing faculty because of the abundance of content that must be covered to ensure that students are not only successful in the course and on the NCLEX but also in nursing practice.

Conclusion

Currently, the mastery learning approach continues to be used in our nursing program. Faculty members are given a summative evaluation of each course based on students' scores on ATI tests related to the course. This allows the faculty to revise their teaching strategies to enhance learning in the subject matter. In addition, computerized testing has been implemented for

the unit, midterm, and final multiple choice examinations to assist faculty with test construction, delivery, and analysis. This is a strategy that administrators and faculty have begun to use to assist with the challenges of test development and test security. The computerized testing provides comprehensive feedback to help guide remedial sessions.

Implementing the mastery learning approach should be considered to attract students with varied educational backgrounds who may be diverse in age, gender, race, ethnicity, geographical location, nationality, and academic abilities. Many of these students have not been exposed to educational backgrounds that support the complex conceptual and critical thinking required by nursing programs. Mastery learning affords students an environment where there is structure and reinforcement, learning at the student's own pace, support from faculty, and remediation as needed.

References

- Assessment Technologies Institute. (2013). *Comprehensive assessment and review program*. Leawood, KS: Author.
- Bloom, B.S. (1982). *All our children learning. A primer for parents, teachers, and other educators*. New York, NY: McGraw-Hill.
- Guskey, T.R. (1996). *Implementing mastery learning* (2nd ed.). Belmont, CA: Wadsworth.
- Institute of Medicine. (2011). *The future of nursing: Leading change, advancing health*. Washington, DC: National Academies Press.
- Lenburg, C.B., Abdur-Rahman, V.Z., Spencer, T.S., Boyer, S.A., & Klein, C.J. (2011). Implementing the COPA model in nursing education and practice settings: Promoting competence, quality care, and patient safety. *Nursing Education Perspectives*, 32, 290-296.
- Levine, D.U. (1985). *Improving student achievement through mastery learning programs*. San Francisco, CA: Jossey-Bass.
- Nagel, T.S., & Richman, P.T. (1972). *Competency-based instruction: A strategy to eliminate failure*. Columbus, OH: C.E. Merrill.
- National League for Nursing. (2009). *Achievement tests for RN programs*. Carbondale, IL: Author.
- National League for Nursing. (2010). *The NLN education competencies model: Our foundation for the future* [President's message]. Carbondale, IL: Author.
- North Carolina Board of Nursing. (1997). *Percentage NCLEX-RN, 1977 to 1997*. Raleigh, NC: Author.
- North Carolina Board of Nursing. (2004). *5-year NCLEX scores*. Raleigh, NC: Author.
- North Carolina Board of Nursing. (2011). *3-year RN pass rates, 2009-2011*. Raleigh, NC: Author.
- Wiggins, G.P., & McTighe, J. (2005). *Understanding by design* (2nd ed.). Upper Saddle River, NJ: Association for Supervision and Curriculum Development.
- Winston-Salem State University, Division of Nursing. (1990). *Student handbook*. Winston-Salem, NC: Author.