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Evaluation and
Testing in

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EDUCATION

Evaluation and Testing in Nursing Education

THIRD EDITION

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Preface

All teachers at some time or another need to assess learning. The teacher may write test items; prepare tests and analyze their results; develop rating scales and clinical evaluation methods; and plan other strategies for assessing learning in the classroom, clinical practice, online and distance education courses, and other settings. Often teachers are not prepared to carry out these tasks as part of their instructional role. This third edition of *Evaluation and Testing in Nursing Education* is a resource for teachers in nursing education programs and health care agencies, a textbook for graduate students preparing for their roles as nurse educators, a guide for nurses in clinical practice who teach others and are responsible for evaluating their learning and performance, and a resource for other health professionals involved in assessment, measurement, testing, and evaluation. Although the examples of test items and other types of assessment methods provided in this book are nursing-oriented, they are easily adapted to assessment in other health fields.

The purposes of this book are to describe concepts of assessment, measurement, testing, and evaluation in nursing education and prepare teachers for carrying these out as part of their roles. The book presents qualities of effective measurement instruments; how to plan for classroom testing, assemble and administer tests, and analyze test results; how to write all types of test items and develop assessment methods; and how to assess higher level cognitive skills and learning. The book describes how to evaluate written assignments in nursing; the processes to follow for clinical evaluation and how to evaluate clinical performance; the social, ethical, and legal issues associated with assessment and testing; the fundamentals of grading; and program assessment. The content is useful for teachers in any setting who are involved in evaluating others, whether they are students, nurses, or other types of health care personnel. For this third edition, we have prepared an *Instructor's*

Manual with a course syllabus, chapter summaries and learning activities for students, and PowerPoint presentations.

Chapter 1 addresses the purposes of assessment, measurement, testing, and evaluation in nursing education. Differences between formative and summative evaluation and between norm-referenced and criterion-referenced measurements are explored. Because effective assessment requires a clear description of *what* and *how* to assess, the chapter describes the use of objectives as a basis for developing test items, provides examples of objectives at different taxonomic levels, and describes how test items would be developed at each of these levels. Some teachers, however, do not use objectives as the basis for testing but instead develop test items and other assessment methods from the content of the course. For this reason chapter 1 also includes an explanation of how to plan assessment using this process.

In chapter 2, qualities of effective assessment procedures are discussed. The concept of assessment validity, the role of reliability, and their effects on the interpretive quality of assessment results are described. Teachers must gather evidence to support their inferences about scores obtained on a measure. Although this evidence traditionally has been classified as content, criterion-related, and construct validity, validity now is considered a unitary concept. New ways of thinking about reliability and its relationship to validity are explained. Also discussed in chapter 2 are important practical considerations that might affect the choice or development of tests and other instruments.

Chapter 3 describes the steps involved in planning for test construction, enabling the teacher to make good decisions about what and when to test, test length, difficulty of test items, item formats, and scoring procedures. An important focus of the chapter is how to develop a test blueprint and then use it for writing test items; examples are provided to clarify this process for the reader. Broad principles important in developing test items regardless of the specific type are described in the chapter.

There are different ways of classifying test items. One way is to group them according to how they are scored—objectively or subjectively. Another way is to group them by the type of response required of the test-taker, which is how we organized the chapters. *Selected-response* items require the test-taker to select the correct or best answer from options provided by the teacher. These items include true–false, matching exercises, multiple-choice, and multiple-response. *Constructed-*

response items ask the test-taker to supply an answer rather than choose from options already provided. Constructed-response items include completion and essay (short and extended). Chapters 4 through 6 discuss these test items.

A true–false item consists of a statement that the student judges as true or false. In some forms, students also correct the response or supply a rationale as to why the statement is true or false. True–false items are most effective for recall of facts and specific information but may also be used to test the student’s comprehension of the content. Chapter 4 describes how to construct true–false items and different variations, for example, correcting false statements or providing a rationale for the response, which allows the teacher to evaluate if the learner understands the content. Chapter 4 also explains how to develop matching exercises. These consist of two parallel columns in which students match terms, phrases, sentences, or numbers from one column to the other. Principles for writing each type of item are presented, accompanied by sample items.

In chapter 5 the focus is on writing multiple-choice and multiple-response items. Multiple-choice items, with one correct answer, are used widely in nursing and other fields. This format of test item includes an incomplete statement or question, followed by a list of options that complete the statement or answer the question. Multiple-response items are designed similarly, although more than one answer may be correct. Both of these formats of test items may be used for evaluating learning at the recall, comprehension, application, and analysis levels, making them adaptable for a wide range of content and learning outcomes. There are three parts in a multiple-choice item, each with its own set of principles for development: (a) stem, (b) answer, and (c) distractors. In chapter 5 we discuss how to write each of these parts and provide many examples. Multiple-response items are now included on the NCLEX[®] as one of the types of alternate item formats; we have a section in chapter 5 on how to write these items.

With selected-response items the test-taker chooses the correct or best answer from the options provided by the teacher. In contrast, with constructed-response items, the test-taker supplies an answer rather than selecting from the options already provided. Constructed-response items include short answer and essay questions. Short-answer items can be answered by a word, phrase, or number. One format presents a question that students answer in a few words or phrases. With the

other format, completion or fill-in-the-blank, students are given an incomplete sentence that they complete by inserting a word or words in the blank space. On the NCLEX[®], candidates may be asked to perform a calculation and type in the number or to put a list of responses in proper order. In this chapter we describe how to write different formats of short-answer items. We also explain how to develop and score essay items. With essay items, students construct responses based on their understanding of the content. Essay items provide an opportunity for students to select content to discuss, present ideas in their own words, and develop an original and creative response to a question. We provide an extensive discussion on scoring essay responses.

There is much debate in nursing education about students developing higher level thinking skills and clinical judgment. With higher level thinking, students apply concepts, theories, and other forms of knowledge to new situations; use that knowledge to solve patient and other types of problems; and arrive at rational and well thought-out decisions about actions to take. The main principle in assessing higher level learning is to develop test items and other assessment methods that require students to apply knowledge and skills in a *new* situation; the teacher can then assess whether the students are able to use what they have learned in a different context. Chapter 7 presents strategies for assessing higher levels of learning in nursing. Context-dependent item sets or interpretive exercises are discussed as one format of testing appropriate for assessing higher level cognitive skills. Suggestions for developing these are presented in the chapter, including examples of different items. Other methods for assessing cognitive skills in nursing also are presented in this chapter: case method and study, unfolding cases, discussions using higher level questioning, debate, media clips, and short written assignments.

Chapter 8 focuses on developing test items that prepare students for licensure and certification examinations. The chapter begins with an explanation of the NCLEX[®] test plans and their implications for nurse educators. Examples are provided of items written at different cognitive levels, thereby avoiding tests that focus only on recall and memorization of facts. The chapter also describes how to write questions about the nursing process and provides sample stems for use with those items. The types of items presented in the chapter are similar to those found on the NCLEX[®] and many certification tests. When teachers incorporate these items on tests in nursing courses, students acquire

experience with this type of testing as they progress through the program, preparing them for taking licensure and certification examinations as graduates.

Chapter 9 explains how to assemble and administer a test. In addition to preparing a test blueprint and skillful construction of test items, the final appearance of the test and the way in which it is administered can affect the validity of its results. In chapter 9, test design rules are described; suggestions for reproducing the test, maintaining test security, administering it, and preventing cheating are presented in this chapter as well. We also included a section on administering tests in an online environment. As more courses and programs are offered through distance education, teachers are faced with how to prevent cheating on an assessment when they cannot directly observe their students; we discuss different approaches that can be used for this purpose.

After administering the test, the teacher needs to score it, interpret the results, and then use the results to make varied decisions. Chapter 10 discusses the processes of obtaining scores and performing test and item analysis. It also suggests ways in which teachers can use posttest discussions to contribute to student learning and seek student feedback that can lead to test item improvement. The chapter begins with a discussion of scoring tests, including weighting items and correcting for guessing, then proceeds to item analysis. How to calculate the difficulty index and discrimination index and analyze each distractor are described; performing an item analysis by hand is explained with an illustration for teachers who do not have computer software for this purpose. Teachers often debate the merits of adjusting test scores by eliminating items or adding points to compensate for real or perceived deficiencies in test construction or performance. We discuss this in the chapter and provide guidelines for faculty in making these decisions. A section of the chapter also presents suggestions and examples of developing a test-item bank. Many publishers also offer test-item banks that relate to the content contained in their textbooks; we discuss why faculty need to be cautious about using these items for their own examinations.

Through papers and other written assignments, students develop an understanding of the content they are writing about; this process also improves their ability to communicate ideas in writing. Written assignments with feedback from the teacher help students improve their

writing ability, an important outcome in any nursing program from the beginning level through graduate study. Chapter 11 provides guidelines for developing and assessing written assignments in nursing courses. The chapter includes criteria for evaluating papers, an example of a scoring rubric, and suggestions for assessing and grading written assignments.

Through clinical evaluation, the teacher arrives at judgments about learners' competencies—their performance in practice. Chapter 12 describes the process of clinical evaluation in nursing. It begins with a discussion of the outcomes of clinical practice in nursing programs and then presents essential concepts underlying clinical evaluation. In this chapter we discuss fairness in evaluation, the stress experienced by learners in clinical practice and the relationship of this stress to evaluation, how to build feedback into the evaluation process, and how to determine *what* to evaluate in clinical courses.

Chapter 13 builds on concepts of clinical evaluation examined in the preceding chapter. Many evaluation methods are available for assessing competencies in clinical practice. We discuss observation and recording observations in anecdotal notes, checklists, and rating scales; simulations, standardized patients, and structured clinical examinations; written assignments useful for clinical evaluation such as journals, nursing care plans, concept maps, case analyses, and short papers; portfolio assessment and how to set up a portfolio system for clinical evaluation, including an electronic portfolio; and other methods such as conference, group projects, and self-evaluation. The chapter includes a sample form for evaluating student participation in clinical conferences and a rubric for peer evaluation of participation in group projects. Because most nursing education programs use rating scales for clinical evaluation, we have included a few examples for readers to review.

Chapter 14 explores social, ethical, and legal issues associated with testing and evaluation. Social issues such as test bias, grade inflation, effects of testing on self-esteem, and test anxiety are discussed. Ethical issues include privacy and access to test results. By understanding and applying codes for the responsible and ethical use of tests, teachers can assure the proper use of assessment procedures and the valid interpretation of test results. We include several of these codes in the Appendices. We also discuss selected legal issues associated with testing.

In chapter 15, the discussion focuses on how to interpret the meaning of test scores. Basic statistical concepts are presented and used

for criterion- and norm-referenced interpretations of teacher-made and standardized test results.

Grading is the use of symbols, such as the letters A through F or pass–fail, to report student achievement. Grading is for summative purposes, indicating how well the student met the outcomes of the course and clinical practicum. To represent valid judgments about student achievement, grades should be based on sound evaluation practices, reliable test results, and multiple assessment methods. Chapter 16 examines the uses of grades in nursing programs, criticisms of grades, types of grading systems, assigning letter grades, selecting a grading framework, and how to calculate grades with each of these frameworks. We also discuss grading clinical practice, as well as using pass–fail and other systems for grading, and provide guidelines for the teacher to follow when students are on the verge of failing a clinical practicum.

Program assessment is the process of judging the worth or value of an educational program. With the demand for high-quality programs, the development of newer models for the delivery of higher education, such as Web-based instruction, and public calls for accountability, there has been a greater emphasis on systematic and ongoing program evaluation. Thus, chapter 17 presents an overview of program assessment models and discusses evaluation of selected program components, including curriculum, outcomes, and teaching.

In addition to this text, we have provided an *Instructor's Manual* that includes a sample course syllabus, chapter summaries and student learning activities, and chapter-based PowerPoint presentations. To obtain your electronic copy of these materials, faculty should contact Springer Publishing Company at textbook@springerpub.com.

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Basic Concepts

PART
I

1

Assessment and the Educational Process

In all areas of nursing education and practice, the process of assessment is important for obtaining information about student learning, to judge performance and determine competence to practice, and to arrive at other decisions about students and nurses. Assessment is integral to monitoring the quality of educational and health care programs. By evaluating outcomes achieved by students, graduates, and patients, the effectiveness of programs can be measured and decisions can be made about needed improvements.

Assessment provides a means of ensuring accountability for the quality of education and services provided. Nurses, like other health professionals, are accountable to their patients and society in general for meeting patients' health needs. Along the same lines, nurse educators are accountable for the quality of teaching provided to learners, outcomes achieved, and overall effectiveness of programs that prepare graduates to meet the health needs of society. Educational institutions also are accountable to their governing bodies and society in terms of educating graduates for present and future roles. Through assessment, nursing faculty members and other health professionals can collect information for evaluating the quality of their teaching and programs as well as documenting outcomes for others to review. All educators,

regardless of the setting, need to be knowledgeable about assessment, measurement, testing, and evaluation.

ASSESSMENT

Educational assessment involves collecting information to make decisions about learners, programs, and educational policies. Are students learning the important concepts in the course and developing the clinical competencies? With information collected through assessment, the teacher can determine relevant instructional strategies to meet students' learning needs and help them improve performance. Assessment that provides information about learning needs is diagnostic; teachers use that information to decide on the appropriate content and instructional activities for students to meet the learning outcomes (Brookhart & Nitko, 2008).

Assessment also generates feedback for students, which is particularly important in clinical practice as students develop their performance skills and learn to think through complex clinical situations. Feedback from assessment similarly informs the teacher and provides data for deciding how best to teach certain content and skills; in this way assessment enables teachers to improve their educational practices and how they teach students.

Another important purpose of assessment is to provide valid and reliable data for determining students' grades. Although nurse educators continually assess students' progress in meeting the objectives and developing the clinical competencies, they also need to measure students' achievement in the course. Grades serve that purpose. Assessment strategies provide the data for faculty to determine if students met the objectives and developed the essential clinical competencies. Grades are symbols, for instance, the letters A through F, for reporting student achievement.

Assessment also generates information for decisions about courses, the curriculum, and the nursing program, and for developing educational policies in the nursing education program. Other uses of assessment information are to select students for admission to an educational institution and a nursing program and place students in appropriate courses.

There are many assessment strategies that teachers can use to obtain information about students' learning and performance. These methods include tests that can be developed with different types of items, papers, other written assignments, projects, small-group activities, oral presentations, portfolios, observations of performance, and conferences. Each of those assessment strategies as well as others will be presented in this book.

Brookhart and Nitko (2008) identified five principles for effective assessment (pp. 7–8). These principles should be considered when deciding on the assessment strategy and its implementation in the classroom, online course, laboratory, or clinical setting.

1. Identify the learning targets (objectives, outcomes, or competencies) to be assessed. Before any assessment can be carried out, the teacher needs to know what knowledge, cognitive skill, value, or performance skill is to be assessed. The clearer the teacher is about *what* to assess, the more effective will be the assessment.
2. Match the assessment technique to the learning target. The assessment strategy needs to provide information about the particular objective, outcome, or competency being assessed. If the objective relates to analyzing issues in the care of patients with chronic pain, a true–false item on a pain medication would not be appropriate. An essay item, however, in which students analyze a scenario about an adult with chronic pain and propose two approaches for pain management would provide relevant information for deciding whether students met that objective.
3. Meet the students' needs. Students should be clear about what is expected of them. The assessment strategies, in turn, should provide feedback to students about their progress and achievement in demonstrating those expectations, and should guide the teacher in determining the instruction needed to improve performance.
4. Use multiple assessment techniques. It is unlikely that one assessment strategy will provide sufficient information about achievement of the objectives. A test that contains mainly recall items will not provide information on students' ability to apply concepts to practice or analyze clinical situations. In most courses multiple assessment strategies are needed to determine whether the objectives were met.

5. Keep in mind the limitations of assessment when interpreting the results. The information generated from an assessment is only a sample of the student's overall achievement. One test or one observation in clinical practice may not be a true measure of the student's learning and performance.

MEASUREMENT

Measurement is the process of assigning numbers to represent student achievement or performance according to certain rules, for instance, answering 85 out of 100 items correctly on a test. The numbers or scores indicate the degree to which a learner possesses a certain characteristic or trait (Brookhart & Nitko, 2008). Measurement is important for reporting the achievement of learners on nursing and other tests, but not all outcomes important in nursing practice can be measured by testing. Many outcomes are evaluated qualitatively through other means, such as observations of performance.

Although measurement involves assigning numbers to reflect learning, these numbers in and of themselves have no meaning. Scoring 15 on a test means nothing unless it is referenced or compared with other students' scores or to a predetermined standard. Perhaps 15 was the highest or lowest score on the test, compared with other students. Or the student might have set a personal goal of achieving 15 on the test; thus meeting this goal is more important than how others scored on the test. Another interpretation is that a score of 15 might be the standard expected of this particular group of learners. To interpret the score and give it meaning, having a reference point with which to compare a particular test score is essential.

In clinical practice, how does a learner's performance compare with that of others in the group? Did the learner meet the clinical objectives and develop the essential competencies regardless of how other students in the group performed in clinical practice? Answers to these questions depend on the basis used for interpreting clinical performance, similar to interpreting test scores.

Norm-Referenced Interpretation

There are two main ways of interpreting test scores and other types of assessment results: norm-referencing and criterion-referencing. In

norm-referenced interpretation, test scores and other assessment data are compared to those of a norm group. Norm-referenced interpretation compares a student's test scores with those of others in the class or with some other relevant group. The student's score may be described as below or above average or at a certain rank in the class. Problems with norm-referenced interpretations, for example, "grading on a curve," are that they do not indicate what the student can and cannot do, and the interpretation of a student's performance can vary widely depending on the particular comparison group selected.

In clinical settings, norm-referenced interpretations compare the student's clinical performance with those of a group of learners, indicating that the student has more or less clinical competence than others in the group. A clinical evaluation instrument in which student performance is rated on a scale of below to above average reflects a norm-referenced system. Again, norm-referenced clinical performance does not indicate whether a student has developed desired competencies, only whether a student performed better or worse than other students.

Criterion-Referenced Interpretation

Criterion-referenced interpretation, on the other hand, involves interpreting scores based on preset criteria, not in relation to the group of learners. With this type of measurement, an individual score is compared to a preset standard or criterion. The concern is how well the student performed and what the student can do regardless of the performance of other learners. Criterion-referenced interpretations may (a) describe the specific learning tasks a student can perform, for example, define medical terms; (b) indicate the percentage of tasks performed or items answered correctly, for example, define correctly 80% of the terms; and (c) compare performance against a set standard and decide whether the student met that standard, for example, met the medical terminology competency (Miller, Linn, & Gronlund, 2009). Criterion-referenced interpretation determines how well the student performed at the end of the instruction in comparison with the objectives and competencies to be achieved.

With criterion-referenced clinical evaluation, student performance is compared against preset criteria. In some nursing courses these criteria are the clinical objectives to be met in the course. Other courses indicate

competencies to be demonstrated in clinical practice, which are then used as the standards for evaluation. Rather than comparing the performance of the student to others in the group, and indicating that the student was above or below the average of the group, in criterion-referenced clinical evaluation, performance is measured against the objectives or competencies to be demonstrated. The concern with criterion-referenced clinical evaluation is whether students achieved the clinical objectives or demonstrated the competencies, not how well they performed in comparison to the other students.

TESTING

A test is a set of items to which students respond in written or oral form, typically during a fixed period of time. Brookhart and Nitko (2008) defined a test as an instrument or a procedure for describing characteristics of a student. Tests are typically scored based on the number or percentage of answers that are correct and are administered similarly to all students. Although students often dread tests, information from tests enables faculty to make important decisions about students.

Tests are used frequently as an assessment strategy. They can be used to assess students' knowledge and skills prior to instruction, which enables the teacher to gear instruction to the learners' needs. Test results indicate gaps in learning and performance that should be addressed first as well as knowledge and skills already acquired. With this information teachers can better plan their instruction. When teachers are working with large groups of students, it is difficult to gear the instruction to meet each student's needs. However, the teacher can use diagnostic quizzes and tests to reveal content areas in which individual learners may lack knowledge and then suggest remedial learning activities. Not only do the test results guide the teacher, but they also serve as feedback to students about their learning needs.

Tests are commonly used to determine students' grades in a course, but in most nursing courses they are not the only assessment strategy. Faculty members ($N = 1573$) in prelicensure nursing programs reported that papers, collaborative group projects, and case study analyses were used more frequently for assessment in their courses than were tests.

However, tests were weighted most heavily in determining the students' course grades (Oermann, Saewert, Charasika, & Yarbrough, 2009).

Tests are used for selecting students for admission to nursing programs. Admission tests provide norms that allow comparison of the applicant's performance with that of other applicants. Tests also may be used to place students into appropriate courses. Placement tests, taken after the individual has been admitted, provide data for determining which courses students should complete in their programs of study. For example, a diagnostic test of math skills may determine whether a nursing student is required to take a medication dosage calculation course.

By reviewing test results teachers can identify content areas that students learned and did not learn in a course. With this information, faculty can modify the instruction to better meet student learning needs in future courses. Last, testing may be an integral part of the curriculum and program evaluation in a school of nursing. Students may complete tests to measure program outcomes rather than to document what was learned in a course. Test results for this purpose often suggest areas of the curriculum for revision and may be used for accreditation reports.

EVALUATION

Evaluation is the process of making judgments about student learning and achievement, clinical performance, employee competence, and educational programs, based on assessment data. Broadfoot (2007) emphasized that the focus of evaluation is on making judgments about quality. In nursing education, evaluation typically takes the form of judging student attainment of the educational objectives and goals in the classroom and the quality of student performance in the clinical setting. With this evaluation, learning outcomes are measured, further educational needs are identified, and additional instruction can be provided to assist students in their learning and in developing competencies for practice. Similarly, evaluation of employees provides information on their performance at varied points in time as a basis for judging their competence.

Evaluation extends beyond a test score or clinical rating. In evaluating learners, teachers judge the merits of the learning and performance based on data. Evaluation involves making value judgments about learn-

ers; in fact, *value* is part of the word “evaluation.” Questions such as “How *well* did the student perform?” and “Is the student *competent* in clinical practice?” are answered by the evaluation process. The teacher collects and analyzes data about the student’s performance, then makes a value judgment about the quality of that performance.

In terms of educational programs, evaluation includes collecting information *prior* to developing the program, *during* the process of program development to provide a basis for ongoing revision, and *after* implementing the program to determine its effectiveness. With program evaluation, faculty members collect data about their students, alumni, curriculum, and other dimensions of the program for the purposes of documenting the program outcomes, judging the quality of the program, and making sound decisions about curriculum revision. As educators measure outcomes for accreditation and evaluate their courses and curricula, they are engaging in program evaluation. Although many of the concepts described in this book are applicable to program evaluation, the focus instead is on evaluating learners, including students in all types and levels of nursing programs and nurses in health care settings. The term *students* is used broadly to reflect both of these groups of learners.

Formative Evaluation

Evaluation fulfills two major roles: it is both formative and summative. Formative evaluation judges students’ progress in meeting the objectives and developing competencies for practice. It occurs throughout the instructional process and provides feedback for determining where further learning is needed. Wang (2008) suggested that formative evaluation is integral to the interaction between students and teacher.

With formative evaluation the teacher assesses continually how well students are learning, gives them prompt and specific feedback about the knowledge and skills that still need to be acquired, and directs the instruction to the gaps in learning so students achieve mastery. Considering that formative evaluation is diagnostic, it typically is not graded. Teachers should remember that the purpose of formative evaluation is to determine where further learning is needed. In the classroom, formative information may be collected by teacher observation and questioning of students, diagnostic quizzes, small-group activities, writ-

ten assignments, and other activities that students complete in and out of class. These same types of strategies can be used to assess student learning in online and other courses offered for distance education.

In clinical practice, formative evaluation is an integral part of the instructional process. The teacher continually makes observations of students as they learn to provide patient care, questions them about their understanding and clinical decisions, discusses these observations and judgments with them, and guides them in how to improve performance. With formative evaluation the teacher gives feedback to learners about their progress in achieving the goals of clinical practice and how they can further develop their knowledge and skills.

Summative Evaluation

Summative evaluation, on the other hand, is end-of-instruction evaluation designed to determine what the student has learned in the classroom, an online course, or clinical practice. Summative evaluation judges the quality of the student's achievement in the course, not the progress of the learner in meeting the objectives. As such, summative evaluation occurs at the end of the learning process, for instance, the end of a course, to determine the student's grade and certify competence. Although formative evaluation occurs constantly throughout the learning experience, for example, each day, summative evaluation is conducted on a periodic basis, for instance, every few weeks or at the midterm and final evaluation periods. This type of evaluation is "final" in nature and serves as a basis for grading and other high-stakes decisions.

Summative evaluation typically judges broader content areas than formative evaluation, which tends to be more specific in terms of the content evaluated. Strategies used commonly for summative evaluation in the classroom and online courses are tests, term papers, and other types of projects. In clinical practice, rating scales, written assignments, portfolios, projects completed about clinical experiences, and other performance measures may be used.

Both formative and summative evaluation are essential components of most nursing courses. However, because formative evaluation represents feedback to learners with the goal of improving learning, it should be the major part of any nursing course. By providing feedback on a continual basis and linking that feedback with further instruction, the

teacher can assist students in developing the knowledge and skills they lack.

Evaluation and Instruction

Figure 1.1 demonstrates the relationship between evaluation and instruction. The objectives specify the intended learning outcomes; these may be met in the classroom, in an online environment, in a learning or simulation laboratory, or in a clinical, or other setting. Following assessment to determine gaps in learning and clinical competency, the teacher selects teaching strategies and plans clinical activities to meet those needs. This phase of the instructional process includes developing a plan for learning, selecting learning activities, and teaching learners in varied settings.

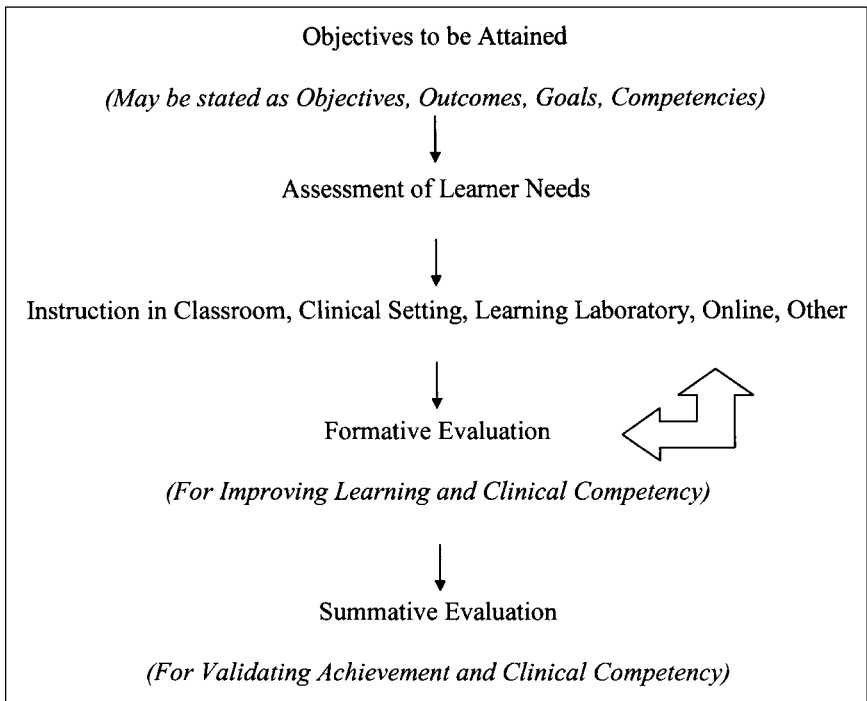


Figure 1.1 Relationship of evaluation and instruction.

The remaining components of the instructional process relate to evaluation. Because formative evaluation focuses on judging student *progress* toward meeting the objectives and demonstrating competency in clinical practice, this type of evaluation is displayed with a feedback loop to instruction. Formative evaluation provides information about further learning needs of students and where additional instruction is needed. Summative evaluation, at the end of the instruction, determines whether the objectives have been achieved and competencies developed.

OBJECTIVES FOR ASSESSMENT AND TESTING

Objectives play an important role in teaching students in varied settings in nursing. They provide guidelines for student learning and instruction and a basis for evaluating learning. The objectives represent the outcomes of learning; these outcomes may include the acquisition of knowledge, development of values, and performance of psychomotor and technological skills. Evaluation serves to determine the extent and quality of the student's learning in relation to these outcomes. This does not mean that the teacher is unconcerned about learning that occurs but is not expressed as outcomes. Many students will acquire knowledge, values, and skills beyond those expressed in the objectives, but the assessment strategies planned by the teacher and the evaluation that is done in a course should focus on the outcomes to be met by students.

To develop assessment strategies for a course, teachers need a clear description of *what* to evaluate. The knowledge, values, and skills to be evaluated are specified by the outcomes of the course and clinical practicum. These provide the basis for evaluating learning in the classroom, practice laboratories, and clinical setting.

Writing Objectives

In developing instructional objectives, there are two important dimensions. The first is the actual technique for writing objectives and the second is deciding on their complexity. The predominant format for writing objectives in earlier years was to develop a highly specific objective that included (a) a description of the learner, (b) behaviors the learner would exhibit at the end of the instruction, (c) conditions

under which the behavior would be demonstrated, and (d) the standard of performance. An example of this format for an objective is: Given assessment data, the student identifies in writing two patient problems with supporting rationale. This objective includes the following components:

Learner:	Student
Behavior:	Identifies patient problems in writing
Conditions:	Given assessment data
Standard:	Two patient problems must be identified with supporting rationale.

It is clear from this example that highly specific instructional objectives are too prescriptive for use in nursing. The complexity of learning expected in a nursing program makes it difficult to use such a system for specifying the objectives. Nursing students need to gain complex knowledge and skills and learn to problem solve and think critically; those outcomes cannot be specified as detailed and prescriptive objectives. In addition, specific instructional objectives limit flexibility in planning instructional methods and in developing assessment techniques. For these reasons, a general format for writing objectives is sufficient to express the learning outcomes and to provide a basis for assessing learning in nursing courses.

Instructional objectives should describe the performance the learner will exhibit as a result of the instruction. Gronlund and Brookhart (2009) recommended stating the objectives in terms of the intended learning outcomes of the instruction; assessment of the performance of students will indicate whether they have learned what was expected of them (p. 4). A general objective similar to the earlier outcome is: The student identifies patient problems based on the assessment. With this example, the components would be:

Learner:	Student
Performance:	Identifies patient problems from the assessment data.

This general objective, which is open-ended, provides flexibility for the teacher in developing instruction to meet the objective and for assessing student learning. The outcome could be met and evaluated

in the classroom through varied activities in which students analyze assessment data, presented as part of a lecture, in a written case study, or in a videoclip, and then identify patient problems. Students might work in groups in or out of class, reviewing various assessments and discussing possible problems, or they might analyze scenarios presented online. In the clinical setting, patient assignments, conferences, discussions with students, and reviews of cases provide other strategies for learners to identify patient problems from assessment data and for evaluating student competency. Generally stated objectives, therefore, provide sufficient guidelines for instruction and evaluation of student learning.

The objectives are important in developing assessment strategies that collect data on the knowledge, values, and skills to be acquired by learners. In evaluating the sample objective cited earlier, the method selected—for instance, a test—needs to examine student ability to identify patient problems from assessment data. The objective does not specify the number of problems, type of problem, complexity of the assessment data, or other variables associated with the clinical situation; there is opportunity for the teacher to develop various types of test questions and assessment methods as long as they require the learner to identify patient-related problems based on the given data.

Clearly written objectives guide the teacher in selecting assessment methods such as tests, observations in the clinical setting, written assignments, and others. When the chosen method is testing, the objective in turn suggests the type of test question, for instance, true–false, multiple-choice, or essay. In addition to guiding decisions about assessment methods, the objective gives clues to faculty about teaching methods and learning activities to assist students in meeting the objective. For the sample objective, teaching methods might include: readings, lecture, discussion, case analysis, simulation, role play, videoclip, clinical practice, postclinical conference, and other approaches that present assessment data and ask students to identify patient problems.

Objectives that are useful for test construction and for designing other assessment methods meet four general principles. First, the objective should represent the outcome expected of the learner at the end of the instruction. Second, it should be measurable. Terms such as *identify*, *describe*, and *analyze* are specific and may be measured; words such as *understand* and *know*, in contrast, represent a wide variety of behaviors, some simple and others complex, making these terms difficult

to assess. The student's knowledge might range from identifying and naming through synthesizing and evaluating. Sample behaviors useful for writing objectives are presented in Table 1.1.

Third, the objectives should be as general as possible to allow for their achievement with varied course content. For instance, instead of stating that the student will identify physiological problems from the assessment of acutely ill patients, indicating that the learner will identify patient problems from assessment data provides more flexibility for the teacher in designing assessment methods that reflect different types of problems a patient might experience based on varied data sets presented in the course. Fourth, the teaching method should be omitted from the objective to provide greater flexibility in how the instruction is planned. For example, in the objective "Uses effective communication techniques in a simulated patient–nurse interaction," the teacher is limited to evaluating communication techniques through simulations rather than through interactions the student might have in the clinical setting. The objective would be better if stated as "Uses effective communication techniques with patients."

TAXONOMIES OF OBJECTIVES

The need for clearly stated objectives becomes evident when the teacher translates them into test items and other methods of assessment. Test items need to adequately measure the behavior in the objective, for instance, to identify, describe, apply, and analyze, as it relates to the content area. Objectives may be written to reflect three domains of learning, each with its own classification or taxonomic system. These domains are: cognitive, affective, and psychomotor. A taxonomy is a classification system that places an objective within a broader system or scheme. Although learning in nursing ultimately represents an integration of these domains, in test construction and the development of other assessment strategies, it is valuable for the domains to be considered separately.

Cognitive Domain

The cognitive domain deals with knowledge and intellectual skills. Learning within this domain includes the acquisition of facts and specific

Table 1.1

SAMPLE VERBS FOR TAXONOMIC LEVELS

COGNITIVE DOMAIN	AFFECTIVE DOMAIN	PSYCHOMOTOR DOMAIN
Knowledge	Receiving	Imitation
Define	Acknowledge	Follow example of
Identify	Ask	Imitate
Label	Reply	
List	Show awareness of	Manipulation
Name		Assemble
Recall	Responding	Carry out
State	Act willingly	Follow procedure
	Assist	
Comprehension	Is willing to	Precision
Defend	Support	Demonstrate skill
Describe	Respond	Is accurate in
Differentiate	Seek	
Draw conclusions	opportunities	Articulation
Explain		Carry out (accurately
Give examples	Valuing	and in reasonable
Interpret	Accept	time frame)
Select	Assume	Is skillful
Summarize	responsibility	
	Participate in	Naturalization
Application	Respect	Is competent
Apply	Support	Carry out
Demonstrate use of	Value	competently
Modify		Integrate skill within
Operate	Organization of Values	care
Predict	Argue	
Produce	Debate	
Relate	Declare	
Solve	Defend	
Use	Take a stand	
Analysis	Characterization by	
Analyze	Value	
Compare	Act consistently	
Contrast	Stand for	
Detect		
Differentiate		
Identify		
Relate		
Select		

(continued)

Table 1.1 (continued)

COGNITIVE DOMAIN	AFFECTIVE DOMAIN	PSYCHOMOTOR DOMAIN
Synthesis Compile Construct Design Develop Devise Generate Plan Produce Revise Synthesize Write		
Evaluation Appraise Assess Critique Discriminate Evaluate Judge Justify Support		

information underlying the practice of nursing; concepts, theories, and principles about nursing; and cognitive skills such as decision making, problem solving, and critical thinking. The most widely used cognitive taxonomy was developed in 1956 by Bloom and associates. It provides for six levels of cognitive learning, increasing in complexity: knowledge, comprehension, application, analysis, synthesis, and evaluation. This hierarchy suggests that knowledge, such as recall of specific facts, is less complex and demanding intellectually than the higher levels of learning. Evaluation, the most complex level, requires judgments based on varied criteria. For each of the levels, except for application, Bloom, Englehart, Furst, Hill, and Krathwohl (1956) identified sublevels.

In an update of the taxonomy by Anderson and Krathwohl (2001), the names for the levels of learning were reworded as verbs, for example, the “knowledge” level was renamed “remembering,” and synthesis and evaluation were reordered. In the adapted taxonomy, the highest level

of learning is “creating,” which is the process of synthesizing elements to form a new product.

One advantage in considering this taxonomy when writing objectives and test items is that it encourages the teacher to think about higher levels of learning expected as a result of the instruction. If the course goals reflect application of concepts in clinical practice, use of theories in patient care, and critical thinking outcomes, these higher levels of learning should be reflected in the objectives and assessment rather than focusing only on the recall of facts and other information.

In using the taxonomy, the teacher decides first on the level of cognitive learning intended and then develops objectives and assessment methods for that particular level. Decisions about the taxonomic level at which to gear instruction and assessment depend on the teacher’s judgment in considering the background of the learner; placement of the course and learning experiences within the curriculum to provide for the progressive development of knowledge, skills, and values; and complexity of the content in relation to the time allowed for teaching. If the time for teaching and evaluation is limited, the objectives may need to be written at a lower level. The taxonomy provides a continuum for educators to use in planning instruction and evaluating learning outcomes, beginning with recall of facts and information and progressing toward understanding, using concepts and theories in practice, analyzing situations, synthesizing from different sources to develop new products, and evaluating materials and situations based on internal and external criteria.

A description and sample objective for each of the six levels of learning in Bloom’s cognitive taxonomy follow. Although sublevels have been established for these levels, except for application, only the six major levels are essential to guide the teacher for instructional and evaluation purposes.

1. **Knowledge:** Recall of facts and specific information: Memorization of specifics.

The student defines the term *systole*.

2. **Comprehension:** Understanding: Ability to describe and explain the material.

The learner describes the circulation through the heart.

- 3. Application:** Use of information in a new situation: Ability to use knowledge in a new situation.

The student applies concepts of aging in developing interventions for the elderly.

- 4. Analysis:** Ability to break down material into component parts and identify the relationships among them.

The student analyzes the organizational structure of the community health agency and its impact on client services.

- 5. Synthesis:** Ability to develop and combine elements to form a new product.

The student develops a plan for delivering services to persons with dementia and their caregivers in the home.

- 6. Evaluation:** Ability to make value judgments based on internal and external criteria and determine the extent to which materials and objects meet criteria.

The learner evaluates the quality of nursing research studies and their applicability to practice.

This taxonomy is useful in developing test items because it helps the teacher gear the item to a particular cognitive level. For example, if the objective focuses on application, the test question should measure whether the student can use the concept in a new situation, which is the intent of learning at that level. However, the taxonomy alone does not always determine the level of complexity of the item because one other consideration is how the information was presented in the instruction. For example, a test item at the application level requires use of previously learned concepts and theories in a new situation. Whether or not the situation is new for each student, however, is not known. Some students may have had clinical experience with that situation or been exposed to it through another learning activity. As another example, a question written at the comprehension level may actually be at the knowledge level if the teacher used that specific explanation in class and students only need to recall the explanation to answer the item.

Marzano and Kendall (2007, 2008) developed a new taxonomy for writing objectives and designing assessment. Their taxonomy addresses

three domains of knowledge—information, mental procedures, and psychomotor procedures—and six levels of processing. The levels of processing begin with retrieval, the lowest cognitive level, which is recalling information without understanding it and performing procedures accurately but without understanding their rationale. At the second level, comprehension, the learner understands information and its critical elements. The third level is analysis, which involves identifying consequences of information, deriving generalizations, analyzing errors, classifying, and identifying similarities and differences. The next level—knowledge usage—is the ability to use information to conduct investigations, generate and test hypotheses, solve problems, and make decisions. Level 5 is metacognition, during which the learner explores the accuracy of information and her or his own clarity of understanding, develops goals, and monitors progress in meeting these goals. The highest level, self-system thinking, occurs when the student identifies his or her own motivations to learn, emotional responses to learning, and beliefs about the ability to improve competence, and then examines the importance of the information, mental procedure, or psychomotor procedure for him or herself.

Affective Domain

The affective domain relates to the development of values, attitudes, and beliefs consistent with standards of professional nursing practice. Developed by Krathwohl, Bloom, and Masia (1964), the taxonomy of the affective domain includes five levels organized around the principle of increasing involvement of the learner and internalization of a value. The principle on which the affective taxonomy is based relates to the movement of learners from mere awareness of a value, for instance, confidentiality, to internalization of that value as a basis for their own behavior.

There are two important dimensions in evaluating affective outcomes. The first relates to the student's knowledge of the values, attitudes, and beliefs that are important in guiding decisions in nursing. Prior to internalizing a value and using it as a basis for decision making and behavior, the student needs to know what are important values in nursing. There is a cognitive base, therefore, to the development of a value system. Evaluation of this dimension focuses on acquisition of

knowledge about the values, attitudes, and beliefs consistent with professional nursing practice. A variety of test items and assessment methods are appropriate to evaluate this knowledge base.

The second dimension of affective evaluation focuses on whether or not students have accepted these values, attitudes, and beliefs and are internalizing them for their own decision making and behavior. Assessment at these higher levels of the affective domain is more difficult because it requires observation of student behavior over time to determine whether there is commitment to act according to professional values. Test items are not appropriate for these levels as the teacher is concerned with the use of values in practice and the motivation to carry them out consistently in patient care.

A description and sample objective for each of the five levels of learning in the affective taxonomy follow:

1. **Receiving:** Awareness of values, attitudes, and beliefs important in nursing practice. Sensitivity to a patient, clinical situation, problem.

The student expresses an awareness of the need for maintaining confidentiality of patient information.

2. **Responding:** Learner's reaction to a situation. Responding voluntarily to a given phenomenon reflecting a choice made by the learner.

The student shares willingly feelings about caring for a dying patient.

3. **Valuing:** Internalization of a value. Acceptance of a value and the commitment to using that value as a basis for behavior.

The learner supports the rights of patients to make their own decisions about care.

4. **Organization:** Development of a complex system of values. Creation of a value system.

The learner forms a position about issues relating to the cost effectiveness of interventions.

5. **Characterization by a value:** Internalization of a value system providing a philosophy for practice.

The learner acts consistently to involve patients and families in decision making about care.

Psychomotor Domain

Psychomotor learning involves the development of skills and competency in the use of technology. This domain includes activities that are movement oriented, requiring some degree of physical coordination. Motor skills have a cognitive base, which involves the principles underlying the skill. They also have an affective component reflecting the values of the nurse while carrying out the skill, for instance, respecting the patient while performing the procedure.

Different taxonomies have been developed for the evaluation of psychomotor skills. One taxonomy useful in nursing education specifies five levels in the development of psychomotor skills. The lowest level is imitation learning; here the learner observes a demonstration of the skill and imitates that performance. In the second level, the learner performs the skill following written guidelines. By practicing skills the learner refines the ability to perform them without errors (precision) and in a reasonable time frame (articulation) until they become a natural part of care (naturalization) (Dave, 1970; Gaberson & Oermann, 2007). A description of each of these levels and sample objectives follows:

1. **Imitation:** Performance of a skill following demonstration by teacher or through multimedia. Imitative learning.

The student follows the example for changing a dressing.

2. **Manipulation:** Ability to follow instructions rather than needing to observe the procedure or skill.

The student suction a patient according to the accepted procedure.

3. **Precision:** Ability to perform a skill accurately, independently, and without using a model or set of directions.

The student takes vital signs accurately.

4. **Articulation:** Coordinated performance of a skill within a reasonable time frame.

The learner demonstrates skill in suctioning patients with varying health problems.

- 5. Naturalization:** High degree of proficiency. Integration of skill within care.

The learner competently carries out skills needed for care of technology-dependent children in their homes.

Assessment methods for psychomotor skills provide data on knowledge of the principles underlying the skill and ability to carry out the procedure in simulations and with patients. Most of the evaluation of performance is done in the clinical setting and in learning and simulation laboratories; however, test items may be used for assessing principles associated with performing the skill.

Integrated Framework

One other framework that could be used to classify objectives was developed by Miller et al. (2009, pp. 54–55). This framework integrates the cognitive, affective, and psychomotor domains into one list and can be easily adapted for nursing education:

- 1. Knowledge** (knowledge of terms, facts, concepts, and methods)
- 2. Understanding** (understanding concepts, methods, written materials, and problem situations)
- 3. Application** (of factual information, concepts, methods, and problem-solving skills)
- 4. Thinking skills** (critical and scientific thinking)
- 5. General skills** (laboratory, performance, communication, and other skills)
- 6. Attitudes** (and values, for example, reflecting standards of nursing practice)
- 7. Interests** (personal, educational, and occupational)
- 8. Appreciations** (literature, art, and music; scientific and social achievements), and

9. Adjustments (social and emotional).

USE OF OBJECTIVES FOR ASSESSMENT AND TESTING

As described earlier, the taxonomies provide a framework for the teacher to plan instruction and design assessment strategies at different levels of learning, from simple to complex in the cognitive domain, from awareness of a value to developing a philosophy of practice based on a value system in the affective domain, and increasing psychomotor competency, from imitation of the skill to performance as a natural part of care. These taxonomies are of value in assessing learning and performance to gear tests and other strategies to the level of learning anticipated from the instruction. If the outcome of learning is application, then test items also need to be at the application level. If the outcome of learning is valuing, then the assessment methods need to examine students' behaviors over time to determine if they are committed to practice reflecting these values. If the outcome of skill learning is precision, then the assessment needs to focus on accuracy in performance, not the speed with which the skill is performed. The taxonomies, therefore, provide a useful framework to assure that test items and assessment methods are at the appropriate level for the intended learning outcomes.

In developing test items and other types of assessment methods, the teacher first identifies the objective or outcome to be evaluated, then designs test items or other methods to measure it. The objective specifies the performance at a particular taxonomic level to be assessed. For the objective "Identifies characteristics of premature ventricular contractions" the test item would examine student ability to recall those characteristics. The expected performance is at the knowledge level: recalling facts about premature ventricular contractions, not understanding them nor using that knowledge in clinical situations.

Some teachers choose not to use objectives as the basis for testing and evaluation and instead develop test items and other assessment methods from the content of the course. With this process the teacher identifies explicit content areas to be evaluated; test items then sample knowledge of this content. If using this method, the teacher should refer to the course outcomes and placement of the course in the curricu-

lum for decisions about the level of complexity of the test items and other assessment methods.

Throughout this book, multiple types of test items and other assessment methods are presented. It is assumed that these items were developed from specific outcomes or objectives, or from explicit content areas. Regardless of whether the teacher uses objectives or content domains as the framework for assessment, test items and other methods should evaluate the learning outcome intended from the instruction. This outcome specifies a behavior to be assessed, at a particular level of complexity indicated by the taxonomic level, and a content area to which it relates. The behavior and content area provide the framework for developing test items and other assessment methods in a course.

SUMMARY

Assessment is the collection of information for making decisions about learners, programs, and educational policies. With information collected through assessment, the teacher can determine the progress of students in a course, provide feedback to them about continued learning needs, and plan relevant instructional strategies to meet those needs and help students improve performance. Assessment provides data for making judgments about learning and performance, which is the process of evaluation, and for arriving at grades of students in courses.

Measurement is the process of assigning numbers to represent student achievement or performance according to certain rules, for instance, answering 20 out of 25 items correctly on a quiz. There are two main ways of interpreting assessment results: norm-referencing and criterion-referencing. In norm-referenced interpretation, test scores and other assessment data are interpreted by comparing them to those of other individuals. Norm-referenced clinical evaluation compares students' clinical performance with those of a group of learners, indicating that the learner has more or less clinical competence than other students. Criterion-referenced interpretation, on the other hand, involves interpreting scores based on preset criteria, not in relation to a group of learners. With criterion-referenced clinical evaluation, student performance is compared with a set of criteria to be met.

A test, which is one form of measurement, is a set of items each with a correct answer. Tests are a commonly used assessment strategy in nursing programs.

Evaluation is an integral part of the instructional process in nursing. Through evaluation, the teacher makes important judgments and decisions about the extent and quality of learning. Evaluation fulfills two major roles: formative and summative. Formative evaluation judges students' progress in meeting the outcomes of learning and developing competencies for practice. It occurs throughout the instructional process and provides feedback for determining where further learning is needed. Summative evaluation, on the other hand, is end-of-instruction evaluation designed to determine what the student has learned in the classroom, an online course, or clinical practice. Summative evaluation judges the quality of the student's achievement in the course, not the progress of the learner in meeting the objectives.

Objectives play a role in teaching and evaluating students in varied settings in nursing. They provide guidelines for student learning and instruction and serve as a basis for developing assessment strategies in a course. The objectives represent the outcomes of learning; these outcomes may include the acquisition of knowledge, development of values, and performance of psychomotor and technological skills. Evaluation serves to determine the extent and quality of the student's learning and performance in relation to these outcomes. Some teachers choose not to use objectives or learning outcomes as the basis for testing and evaluation and instead develop their assessment strategies from the content of the course. With this process the teacher identifies explicit content areas to be evaluated; test items and other strategies assess how well students have learned that content. The important principle is that the assessment relates to the learning outcomes of the course.

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