Test Construction & Item-Writing

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Objectives

1. Examine a test blueprint construction
2. Describe best practices for writing multiple choice questions
3. Compare lower and higher level questions
4. Analyze test questions and edit to create higher level questions

Exams

- Should require that students think
- Questions should be a mix of low and high order
- Short-answer essay questions test the ability of students to analyze information and draw conclusions.
- Take-home essay question written specifically to enhance critical thinking. Questions that go beyond the lecture material forcing the use of lecture notes and book to answer a complicated question.

Education Instruction

- Planning
- Teaching
- Assessment

Covey's Time Management grid

<table>
<thead>
<tr>
<th></th>
<th>Urgent</th>
<th>Not Urgent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important</td>
<td>Urgent &amp; Important</td>
<td>Not Urgent but Important</td>
</tr>
<tr>
<td>Not Important</td>
<td>Urgent but Not Important</td>
<td>Not Urgent &amp; Not Important</td>
</tr>
</tbody>
</table>

Effective Assessment – 5 principles

- Identify the learning targets (obj/competencies)
- Match assessment technique to learning targets
- Meet the students’ needs
- Use multiple assessment techniques
- Remember assessment limitations when interpreting results

Brookhart & Nitko (2008)

2 Methods for Measurement

- Norm Referenced – compares student’s scores with others
- Criterion Referenced – compares student’s scores with preset criterion

Tests

- Use to assess student’s knowledge and skills prior to instruction
- Determine student’s grades
- Selecting students for admission
- Curriculum and program evaluation (accreditation)
Underlying Concepts

PURPOSE OF A TEST

Provide information about an individual's achievement of a course objective or mastery of an area of nursing content.

Evaluation – 2 major roles

- Formative
  - Obj and competencies met?
  - Is further learning needed?
- Summative
  - End of course
  - Quality of students’ achievement

Test Plan

- What – defined by objectives and course content
- How – directed by the test plan or blueprint
- Schedule
- Length of test

Test Plan Grid

<table>
<thead>
<tr>
<th></th>
<th>1st Term</th>
<th>2nd Term</th>
<th>3rd Term</th>
<th>4th Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Questions</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Comprehension Questions</td>
<td>50%</td>
<td>40%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>Application and Analysis Questions</td>
<td>25%</td>
<td>40%</td>
<td>75%</td>
<td>80%</td>
</tr>
</tbody>
</table>
Step 1 - Select Objective

- Select a test objective:
  - Based on specific behavioral objectives of the course.
  - Specify one task, skill, or concept that is behaviorally specific, result oriented, and within the student’s area of knowledge or responsibility.

Item Writing

- An effective item:
  - Discriminates students who understand the content from those who do not.
  - Focuses on important information.
Remembering:
Can the student recall or remember the information?
define, duplicate, list, memorize, recall, repeat, reproduce state

Understanding:
Can the student explain ideas or concepts?
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase

Applying:
Can the student use the information in a new way?
choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.

Analyzing:
Can the student distinguish between the different parts?
appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.

Step 2 – Write the Stem
Write the question stem based on the behavioral objective.

Bad – Joe, aged 25, is admitted to the hospital with a ruptured appendix. His temperature is 101°F and WBC is 15,000. During his post-op recovery phase Joe receives TPN and complains of thirst and frequent urination. This complaint most likely indicates:

Good - The nurse cares for a patient receiving TPN. The patient reports increased thirst and frequent urination. These symptoms MOST likely indicate the following complication.
Question Stem

<table>
<thead>
<tr>
<th>Should</th>
<th>Should not:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contain a subject and a verb</td>
<td>Contain irrelevant information</td>
</tr>
<tr>
<td>CAPITALIZE, italicize, or underline qualifier word to support the critical thinking process</td>
<td>“Teach” information</td>
</tr>
<tr>
<td>Always be a patient and a nurse</td>
<td></td>
</tr>
</tbody>
</table>

Step 3 – Write the Answers

- Write and validate the correct answer
  - “I should remain on complete bedrest.”
  - “I should eat a low-protein diet.”
- Create distracters from errors or misconceptions.
  - “My abdomen is large because I eat a lot, there’s nothing wrong with my liver.”

Answer Choices

<table>
<thead>
<tr>
<th>Should</th>
<th>Should not:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate unnecessary words.</td>
<td>Contain key words or phrases related to information in the stem.</td>
</tr>
<tr>
<td>Enable students to choose the correct answer because they know the information tested, not because of the way answer choices are written.</td>
<td>Vary in length, vocabulary, or syntax.</td>
</tr>
<tr>
<td>Be mutually exclusive. One answer choice should not be included in another.</td>
<td></td>
</tr>
</tbody>
</table>

Distracters

- Can be diagnostic and provide information about the student’s lack of knowledge.
- Can be a predictable error, a common misconception, a clinical error, an incomplete but related idea, or a common procedural mistake.
Distracters (cont)

<table>
<thead>
<tr>
<th>Should</th>
<th>Should not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be realistic and plausible.</td>
<td>Be close in meaning to the correct response.</td>
</tr>
<tr>
<td>Be the same length and grammatically similar.</td>
<td>Be direct opposites of distracters or the correct answer.</td>
</tr>
<tr>
<td>Be consistent with the correct answer.</td>
<td>Be absolute: such as always or never.</td>
</tr>
<tr>
<td>Be homogenous.</td>
<td></td>
</tr>
<tr>
<td>Be inviting and well written, but not tricky!</td>
<td></td>
</tr>
</tbody>
</table>

To Review:
Question Construction Concepts

- Step 1 – Select Objective
- Step 2 – Write the Stem
- Step 3 – Write the Answers

Level of Question Difficulty

- Analysis
- Application
- Understanding
- Recall/Recognition

Passing Level Questions

Knowledge (Remembering) Level

- Requires recall or recognition of information previously learned.
- Question requires no understanding or judgment.
- Good for testing factual information.
- Limited value for testing nursing competence.
The nurse cares for a patient during the first 24 hours after a percutaneous liver biopsy. Which of the following is a complication of that procedure?

1. Nausea, and vomiting.
2. Constipation.
3. Pain at the biopsy site.
4. Hemorrhage.

The nurse cares for a patient after a percutaneous liver biopsy. The nurse understands that hemorrhage is a complication of this procedure for which of the following reasons?

1. There are several large blood vessels near the liver.
2. The liver cells are bathed with a mixture of venous and arterial blood.
3. The test is performed on patients with elevated enzymes.
4. The procedure requires a large piece of tissue to be removed.

• Requires students to apply their knowledge in a situation.
• Tests ability to use learned concepts in specific situations.
• This is where you are asking the student to make some sort of judgment.
Application Level (cont)

The nurse observes care for the client post liver biopsy and should intervene if which of the following is observed?
1. The patient is lying on their right side.
2. The patient complains of pain at the biopsy site.
3. The patient is ambulating 1 hour post procedure.
4. The patient is fed a regular diet.

Analysis Level

- Requires students to break down information to obtain the meaning of the material or demonstrate how it is organized or structured.
- Requires students to analyze the situation, interpret data, set goals, establish nursing diagnoses, set priorities, and determine actions.

Analysis Level (cont)

Which of the following symptoms, if observed by the nurse 24 hours after a patient's percutaneous liver biopsy, indicate a complication from the procedure?
1. Anorexia, nausea, and vomiting.
2. Abdominal distention and discomfort.
3. Constant pain at the biopsy site.

Creating Higher Level Questions

- In the stem of the question, give clinical assessment data rather than the diagnosis. This requires students to analyze the data to answer the question.
- Example:

  Describe symptoms of pulmonary edema rather than state "client with pulmonary edema..."
Creating Higher Level Questions (cont)

• Write questions that include integrated concepts.
• Examples:
  Diabetic woman in postpartum situation
  Pediatric patient in surgery
  Elderly patient receiving medication

General Rules

• Avoid bias by gender.
• Use a description of the patient without a proper name.
• Write questions at appropriate grade reading level. (PN textbooks 10th – 11th grade level; RN textbooks 11th - 13th; varies by book).
• Write as a team or review each other’s questions.
• Write in the active voice and put a patient and nurse in stem.

General Rules, cont.

• Don’t try to write the test in one day.
• Write one or two questions after each class.
• Randomly distribute the correct response among the alternatives throughout the test.
• Allow 1 minute to respond to each item.
• Utilize a test plan.

Question Formats

• Multiple-choice questions with 4 possible answer choices
• Alternate question types
  ○ Multiple response
  ○ Ordered response
  ○ Hot spot
  ○ Calculation
  ○ Chart exhibit
  ○ Fill in the blank
The LPN/LVN cares for a patient diagnosed with heart failure (HF). Which assessment is consistent with left-sided heart failure?

1. Dependent edema.
2. Shortness of breath.
3. Anorexia.

The LPN/LVN cares for clients in the long-term care facility. The LPN/LVN notes the client gained 7 pounds in one week. Which response by the LPN/LVN is BEST?

1. Contact the RN.
2. Determine if the client is eating more than three meals a day.
3. Contact the dietician.
4. Encourage the client to balance rest and activity.
References


References continued:

- a_taxonomy.htm

References continued:

- University of North Carolina School of Nursing. Center for Instructional Technology & Educational Support. Guide to creating multiple choice tests. Retrieved June 2, 2010 from http://docs.google.com/viewer?a=v&q=cache:o6f4dmZT8SYJ:nursing.unc.edu/sites/coursesdev/mctests.pdf+unc+school+of+nursing+multiple+choice+tests&hl=en&gl=us&pid=bl&srcid=ADGEEShNq0jIgCr6hv0qV_gFvWngwk9GeocoCFHhjXFQz9IrVhFGQX9dClyEE.JEIEexxGKgRh1ZE_DuqRtrbJ8wZm99bUJfZtZvAUv1sRvsoxS2p

Thank you!

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