TESTING AS TEACHING

v 2.0

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Completing a test or quiz can be a learning process in itself

- Formative testing
- Summative testing

“homework” vs. “test”
Online testing
a powerful form of testing & teaching

- Automatic
- Accessible
- Images, including animations
- Immediate feedback
- Flexible
- Multiple repetitions
Case Study

- Anatomy & Physiology course
- Students
  - Undergraduate
  - Nursing
  - Health Information
  - Occupational therapy
  - Other health-related professions
Old way
- All paper tests
- 6 written tests
- Limited, still monochrome illustrations, photographs, other images

New way
- Both online & paper tests
- 9 online pre-tests
  9 online tests (3x)
- 2 online practice exams
- 2 written exams
- All types of color & animated images available
Online tests

- Edit images to be used in test
- Create tests in **Respondus**
  - Test creation software
  - Uploads tests to LMS
- Administer tests in **LMS**
  - Online testing platform
  - LMSs also create tests but interface is often less friendly than Respondus

*LMS = Learning management system*
Online tests

- Edit images for test items
  - Image/photo editing programs
  - MS Word or PowerPoint
  - Web-based image editing
  - Save images with “mystery names”
Image sources

● Textbook images
  ● Unlabeled or cover labels
● Purchased image collections
● Free online resources
  ● Wikimedia Commons
  ● Free image libraries and public domain sources
    ● The A&P Professor
    ● Gray's Anatomy (19th century edition)
● Take your own photos
● Draw your own diagrams
Add arrows, labels, etc.

Save as compatible file type (jpg, gif, png)
Animations

From http://www.merck.com
Online tests

- Tests created in Respondus
  - Test creation software
  - Uploads tests to online testing platform
Which of these is the mitral valve?

- a. A
- b. B
- c. C
- d. D
- e. E
- f. F
- g. G
- h. H
- i. I
- j. J
- k. K
- l. L
- m. M
- n. N
- o. O
Item types

- Multiple Choice
- True and False
- Paragraph
- Matching
- Short Answer
- Multiple Response

- Enable Feedback
- Copy from Another File
Question 11: (1.00 points)
Which of these is the right ureter?
- a. A
- b. B
- c. C
- d. D
- e. E

Question 14: (1.00 points)
The location highlighted by starburst is where one could find the
- a. juxtamedullary nephron
- b. thick ascending limb of Henle
- c. juxtaglomerular apparatus
- d. thin ascending limb of Henle
- e. juxtaglaminburger
Organize items into "question sets" or "random blocks"

A "question set" is a group of questions from which a random selection is presented to students during the exam. For example, you can create a question set containing 10 questions from which 2 will be selected and presented to students during the quiz.

Before creating question sets in Respondus, you should have your file organized so that questions being included in a question set are grouped together.

For example, if the fifth question in an exam is going to be randomly selected from a question set that contains three questions, these three questions should be grouped together at 5, 6, and 7 in the file. See Help for more information.
Before using this task, you should first place all questions in the desired order. See the online help for additional instructions and guidelines.

Total Items: 36  Points: 50.0

- Add New Set
- Modify or Delete Existing Set

Enter the number of the FIRST question to be used in the set: 1

Enter the number of the LAST question to be used in the set: 7

How many questions in this set should be randomly selected during the exam?
- All
- Select Number: 1

Enter the point value that should be used for questions in this set: 1.00

<table>
<thead>
<tr>
<th>#</th>
<th>Set</th>
<th>Title</th>
<th>Format</th>
<th>Question Wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A Heart A</td>
<td>Short Answer</td>
<td>The human heart has two superior chambers called <em>?</em> and two inferior chambers.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A Heart A 2</td>
<td>Short Answer</td>
<td>The human heart has two superior chambers. It also has two inferior chambers called <em>?</em>.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A Heart A 3</td>
<td>Short Answer</td>
<td>The human heart has a wider superior region called the <em>?</em> and a lower pointed region.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>A Heart A 4</td>
<td>Short Answer</td>
<td>The human heart has a lower pointed region called the <em>?</em>.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>A Heart A 5</td>
<td>Short Answer</td>
<td>The human heart has an inner dividing wall called the <em>?</em>.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>A Heart A 6</td>
<td>Short Answer</td>
<td>The human heart is located in the <em>?</em> (region) of the thoracic cavity.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>A Heart A 7</td>
<td>Short Answer</td>
<td>The human heart is normally located slightly <em>?</em> (direction) of exact medial placement in th</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>B Heart B</td>
<td>Multi Choice</td>
<td>The interior lining of the heart's chambers is called the</td>
<td></td>
</tr>
</tbody>
</table>
Randomization

- Each item may have randomized choices
- Each question set may be randomized
- Each attempt by each student is different
- Each attempt by each student is unpredictable
- Literally thousands of different combinations. Even millions!
Online tests

- Tests administered in LMS
  - Online testing platform
  - LMSs also creates tests... but interface is often less friendly than Respondus
  - Automatic grading
  - Immediate feedback to students
  - Adaptive capabilities
Which of these shows renal pyramids?

- a. A
- b. B
- c. C
- d. D
- e. E
- f. F

Students may now take tests online
Students view results online

- Immediate feedback
- Students may effectively prepare for their next attempt
We’ve taken our yellow submarine out for a cruise through the blood supply. Put these in the correct order that blood passes through them in the kidneys:

Student response:
- first — renal artery: Correct
- second — afferent arteriole: Correct
- third — efferent arteriole: Incorrect
- fourth — renal corpuscle: Incorrect
- fifth — peritubular capillaries: Correct

Score: 1.8 / 3

Question 19 (1 point)
In the kidney tubules, the term secretion ordinarily refers to

Student response:

<table>
<thead>
<tr>
<th>Percent Value</th>
<th>Student Response</th>
<th>Answer Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.0%</td>
<td></td>
<td>a. moving molecules out of the blood and into the tubule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. moving molecules out of the tubule and into the blood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. moving molecules out of the exocrine cells and into the blood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. moving molecules out of the endocrine cells and into the blood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. moving molecules out of the endocrine cells and into the tubule</td>
</tr>
</tbody>
</table>

Score: 1 / 1

Automatic scoring may also be programmed to provide the correct answer or to provide additional feedback.
Effectiveness

- What is the experience of the teacher?
- I found that the online approach is effective
  - Grades improved
Grade improvement?

<table>
<thead>
<tr>
<th></th>
<th>Old way</th>
<th>New way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Average</td>
<td>70</td>
<td>74</td>
</tr>
<tr>
<td>Final Exam</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Number of students</td>
<td>159</td>
<td>197</td>
</tr>
</tbody>
</table>

Valid comparisons?

Improvement in course average?
Grade improvement?

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</thead>
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<tr>
<td>Course Average</td>
<td>70</td>
<td>79</td>
</tr>
<tr>
<td>Final Exam</td>
<td>46</td>
<td>67</td>
</tr>
<tr>
<td>Number of students</td>
<td>159</td>
<td>210</td>
</tr>
</tbody>
</table>

Improvement in final exam scores?
Grade improvement?

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<thead>
<tr>
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<td>Number of students</td>
<td>159</td>
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</tr>
</tbody>
</table>

Improvement in student retention?

(all groups began each semester at 225)
Effectiveness

- What is the experience of the teacher?
- I found that the online approach is effective
  - Grades seemed to improve
  - Less class time spent on testing
  - Less time grading tests
Effectiveness

- What is the experience of students?
- Online survey of 171 students
- Found that the online approach is effective
Do online tests make you better prepared for the exams?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>170</td>
<td>1</td>
</tr>
<tr>
<td>Percentage</td>
<td>99.4%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>
Do online tests help you learn the concepts of the course better?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>155</td>
<td>16</td>
</tr>
<tr>
<td>%</td>
<td>90.6</td>
<td>9.4</td>
</tr>
</tbody>
</table>

155 students said Yes, and 16 students said No.
Do online tests help you prepare for practical exams in the lab?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>153</td>
<td>18</td>
</tr>
<tr>
<td>Percentage</td>
<td>89.5%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>
What resources do you use while taking an online test?

<table>
<thead>
<tr>
<th>Resource</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textbook</td>
<td>164</td>
<td>7</td>
</tr>
<tr>
<td>Outlines</td>
<td>170</td>
<td>1</td>
</tr>
<tr>
<td>Notes</td>
<td>142</td>
<td>28</td>
</tr>
<tr>
<td>Printout of previous attempt</td>
<td>155</td>
<td>16</td>
</tr>
</tbody>
</table>
Do online tests have a high level of difficulty?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>65</td>
</tr>
<tr>
<td>62.0%</td>
<td>38.0%</td>
</tr>
</tbody>
</table>
Added features

- Cumulative testing
  - Questions from previous tests added
  - Reinforces prior learning
  - Copy questions from prior test files and group them into larger randomized sets
    - Be selective
Added features

- Pre-tests
  - Cumulative questions removed and posted as separate PRE-test
  - Students take pre-test in order to “unlock” resources and “real” test for each topic
  - No preparation for this test
    - Can time these tests so they won’t look up answers
  - No grade (no risk)
  - Randomization means they won’t see the EXACT test again
Adaptive testing

- Adaptive refers to ability of testing system to alter (adapt) its behavior based on student performance
  - Repeat troublesome questions
  - Provide feedback or redirect to tutorial
- Some LMS systems can be programmed with adaptive features
Packaged solutions

- Many publishers provide
  - Test banks (often in Respondus format)
  - Adaptive testing solutions
  - Other testing solutions

- Considerations
  - Cost
  - Can you add your own material?
  - Rich analysis available
Effective learning

- Students are challenged by online tests
- Students spend time exploring resources
  - Textbook/atlas
  - Course outlines
  - Class notes
  - Previous test attempts
- Students feel better prepared for exams
- Students feel they’ve learned more overall
Some practical points

- How do I apply this to an existing course?
  - Add online quizzes or tests?
  - Replace some in-class tests?
- Do I have an online testing platform & resources available?
  - Campus or free LMS platforms
  - Your textbook publisher?
    - Any added costs to students?
  - Do I need an add-on design program?
More practical points

- What software do I need?
  - Do I have an image editor?
  - Do I have a test design program? (Respondus)
- What skills do I need?
  - Can I edit an image?
  - Can I learn the testing software?
  - Can I manage the online platform?
  - What help is available to gain these skills and support them?
Part of the inhumanity of the computer is that, once it is competently programmed and working smoothly, it is completely honest.

Isaac Asimov