Measuring Student Learning in Online Courses: *Assessment Strategies that Work*

Matt Crosslin, Amy Austin, Subhra Mandal, Andrew Clark, Justin T. Dellinger, Thomas Dombrowsky, Melanie Sattler, and Ann Cavallo

Agenda

- Ann Cavallo – Welcome
- Matt Crosslin – Overview of Assessment
- Amy Austin – Virtual Culture Experience Assessment
- Subhra Mandal – Term Papers and Research Proposal Assignments
- Andrew Clark – Using Discussion Board for Assessment
- Justin T. Dellinger – Assignment Banks
- Thomas Dombrowsky – Respondus and Lockdown Browser
- Melanie Sattler – Online Exams Involving Problem Solving
- Ann Cavallo – Two-tiered Multiple-Choice and Assessment Efficacy
- Q&A/ Open Discussion

UNIVERSITY OF TEXAS ARLINGTON

Measuring Student Learning in Online Courses:

Assessment Strategies that Work

Center for Research on Teaching and Learning Excellence

April 13, 2020, 12:00 - 2:00pm

Overview of Assessment

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Assessment

"It's Complicated"

- Every class is different, so we are not presenting "one size fits all" solutions.
- Hopefully there will be many ideas that you can adjust, combine, or remix for your course.
- We also know there are certification and departmental requirements on some forms of testing.
- Assessment is complicated online and face to face.
- We are all accustomed to being assessed in face to face classes. Online, not so much.

Assessment

What is Learning?

- We can’t directly measure student “learning.”
- We do know that the metaphor of the “brain as a computer” is not accurate.
- Unfortunately, we don’t have a better metaphor.
- Most forms of assessment we have are still loosely based on the “brain as computer” metaphor.
- We are measuring students ability to apply what they learned to a series of tasks we have designed.
- This causes problems with multiple choice / true false / etc standardized testing.

Assessment

What are Some of the Problems?

- Bias in test questions, communication problems, etc.
- The sudden changes in society are stressful for all.
- Big, high stakes testing causes major stress on students and instructors alike in normal circumstances.
- Proctoring tools are causing big problems with invasion of privacy, strict monitors, and excessive flagging:
  - Is it a good idea to expose student's personal space at home to strangers at Proctoring services?
  - With more people home, there are more people in the room moving around, setting off motion detectors.
  - Reports of medical emergencies being ignored while taking tests due to inflexibility of proctoring systems.
  - Stress of having a camera pointed at students is causing many other problems as well.

Other Ways to Assess

Think Outside the “Multiple Choice Box”

- How can students demonstrate what they have learned?
- University of Saskatchewan has a good guide for Thinking Through Assessment Needs:
  - What can you just drop because students need less stress?
  - What is essential to assess, and what can be set aside?
  - Are there other forms of assessment that would work – like discussions, projects, portfolios, papers, etc?
  - Would it be possible to have longer term projects that focus on applying course topics to real life?
  - Can you set up smaller check points for assessment rather than just one big, stressful test at the end?

Other Ways to Assess

Authentic, Active, Formative, Experiential

- Authentic: How can I focus on knowledge / skills that can be applied outside the classroom?
- Active: How can students take part in the learning / assessment process?
- Formative: How can I tell what students are learning during the process, not just at the end?
- Experiential: How can I get students off the computer (or outside the LMS) to learn by doing, or by learning by reflecting on doing?

Other Ways to Assess

Standardized Tips

- Multiple Choice questions work great as a knowledge check – a few questions with no “gotchas” that students can take as many times as they want to make sure they interacted with key information.
- To minimize “cheating” online:
  - Randomize questions.
  - Shuffle answer options, but avoid “all of the above,” “both A and B,” etc.
  - Use question pools. Create several scenario questions that assess application of a specific set of knowledge/skills, and have the test pick a random from the pool for each student.
  - Put students in groups and give different tests to different students (or use assignments in place of quizzes). Assess the same knowledge/skills, but change up questions, pools, etc.
  - Embrace “open book” testing by writing questions that assess their ability to find and understand answers rather than memorize them.

Virtual Museum Tours for SPAN 3311: Spanish Culture and Civilization

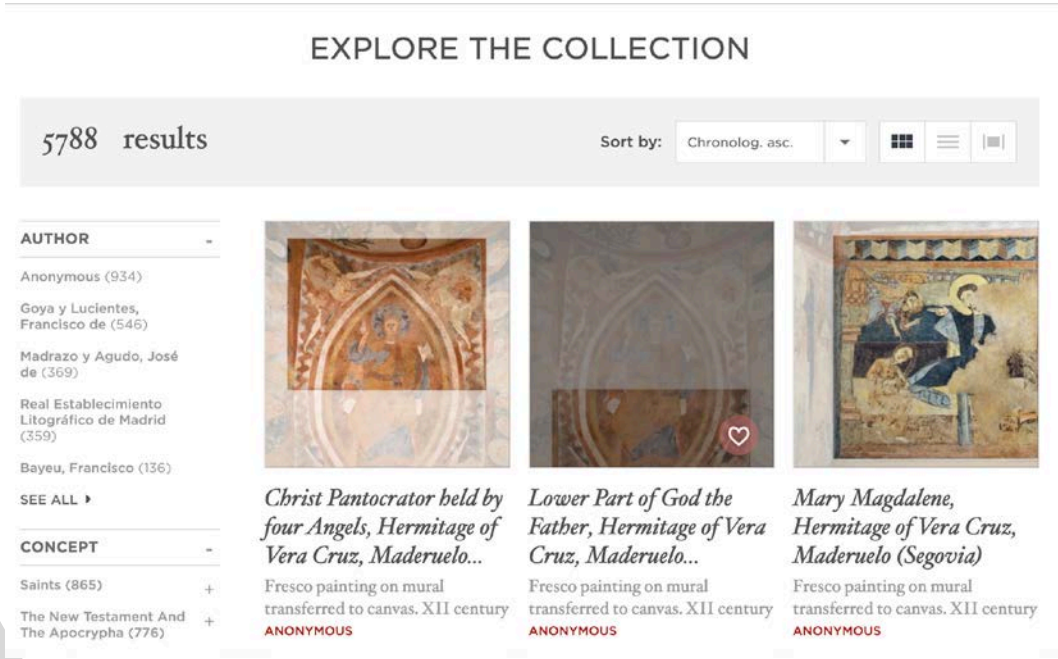
Dr. Amy Austin

Lesson 1: The Spanish Baroque and Beyond

- Lesson: The Spanish Baroque
- Text: *Las meninas* by Diego de Silva y Velázquez (1656)

The Collection at the Museo del Prado

- Online discussion assignment
  - Visit the online collection of the Museo del Prado.
  - Choose one painting that relates to a theme we have been studying in class.
  - Post a paragraph or a short video telling the class about a) the painting and the artist, b) why you chose that painting and c) how it relates to the theme of the class.
  - Respond thoughtfully to at least two classmates.



Lesson 2: The Spanish Civil War and Picasso

Lesson: The Spanish Civil War

Text: *Guernica* by Pablo Picasso (1937)

Rethinking Guernica is a website based on over two years' research and compiles and presents ma to Pablo Picasso's Guernica, the painting, which currently hangs in the Museo Reina Sofía, the artis the Spanish Pavilion at the Paris World's Fair of 1937.

Envisaged as an archive of archives and made up of more than 2,000 documents from 120 public a archives and national and international agencies, the website is a tool of open knowledge that is co evolving. Holding a prominent place on *Rethinking Guernica* is the Gigapixel study of the work. By a cutting-edge technology to the knowledge, analysis and conservation of artistic heritage, the study together and arranges a broad number of images of the picture.

Special exhibit at the Reina Sofía

Online discussion assignment

- Visit the online special exhibit "Re-pensando *Guernica*" at the Museo Nacional Centro de Arte Reina Sofía.
- Write a paragraph or upload a video about how the exhibit made you re-think the Spanish Civil War and the international impact of Picasso's painting.
- Respond thoughtfully to at least two classmates.

Online Discussion Rubric

Points	10	7	3	0
Quality of Post	Appropriate comments: thoughtful, reflective, and respectful of other's postings.	Appropriate comments and responds respectfully to other's postings	Responds, but with minimum effort. (e.g. "I agree with Bill")	No posting.
Relevance of Post	Posts topics related to discussion topic; prompts further discussion of topic	Posts topics that are related to discussion content	Posts topics which do not relate to the discussion content; makes short or irrelevant remarks	No posting.
Contribution to the Learning Community	Aware of needs of community; attempts to motivate the group discussion; presents creative approaches to topic	Attempts to direct the discussion and to present relevant viewpoints for consideration by group; interacts freely	Does not make effort to participate in learning community as it develops	No feedback provided to fellow student.

Alternate Assessment Strategy for Online Courses

Subhra Mandal
Professor, Department of Chemistry and Biochemistry, The University of Texas at Arlington.

General Biochemistry II, (Chem 4312, Undergraduate)

Strategy (Write a term paper on a topic)

- Assign a class related topic, ask students to study, watch online videos, study recent literatures, and develop a term paper
- Make study groups who will study in together, however will write term paper independently

Example

Topic: "Replication of telomere DNA and telomerases"

Assignment: Study the subject in depth, review recent literatures, and write a term paper describing the following. [Length: 3 pages including figures, 30 points total]

- Describe the mechanism of telomere DNA replication
- Explain its significance in terms of aging and cancer
- Provide your thoughts on how you can take advantage of this to develop therapies for aging and cancer.

Genes, Genomes, and Reaction Mechanism, (Chem 5334, Graduate)

Strategy: ***Assign a topic and ask students to develop a research proposal***.

Example**:**
Topic: *Corona virus*
Assignment: Review at least 5 recent research articles and 3 reviews on corona virus. Based on your studies, write a research proposal using following guidelines *(NIH R21 proposal style, 6 pages, 25 points).*

- Structure, genomes, and genes and proteins encoded by the corona.
- Mechanism of host cell recognition, amplification, viral propagation
- Host cell response and mechanism
- Potential therapeutic approach
- PPT presentation in class using TEAMS

DISCUSSION BOARDS

DISCUSSION BOARD

- Be clear about what you're looking for, it improves the posts and gives you a grading framework.

Pay attention to the news values we have talked about and demonstrated in class. Pay attention to production techniques and production values including use of b-roll, framing, shot selection etc. Also examine content of the stories including leads, transitions, writing style, and use of sources.

Your original post should be at least 250 words, and you must include a link to outside content that will aid in our understanding of material in this module. In addition to your original post you must respond to two other people in the class.

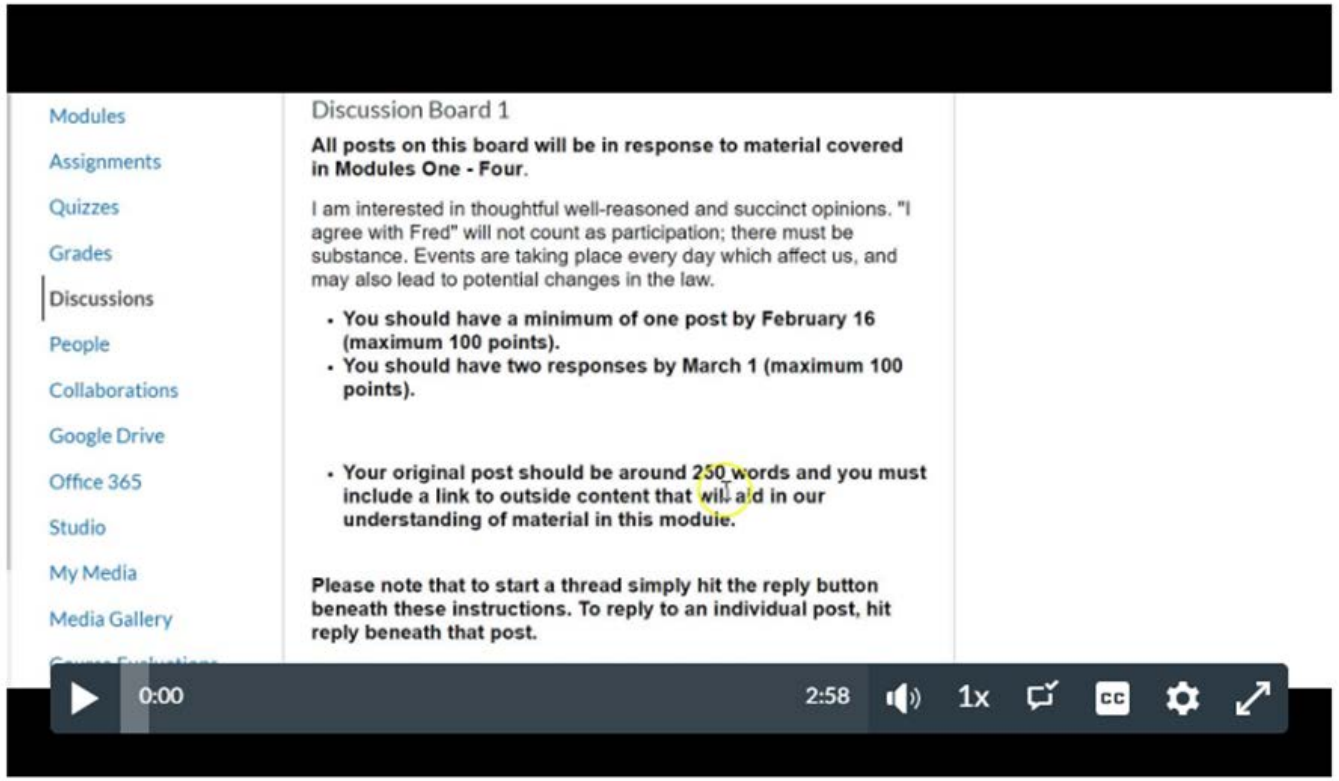
60 Minutes - USA

60 Minutes - Australia

DISCUSSION BOARD

Discussion Board explanation video

This video explains the requirements for the Discussion Board assignment.



DISCUSSION BOARD

- When you see someone doing it right let them know.
- Model what you want to see from their responses.
- Encourage them to look outside class for material for their posts.

- In both posting and responding it is important to be respectful of others even when disagreeing. The term Netiquette refers to the rules of behavior on the Internet. The following link provides some good tips dealing with discussion boards. http://education.com/reference/article/netiquette-rules-behavior-internet/

DISCUSSION BOARD

- Large classes are harder; let the students know you can't respond to every post.

- Simplify your grading rubric.

Assignment Banks and Strategies for Self-Regulated Learning

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Center for Research on Teaching and Learning Excellence
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Self-Regulated Learning

What is SRL? It is a conceptual framework to understand the cognitive, motivational, and emotional aspects of learning (Panadero, 2017).

Three Phases of Cyclical Process:

1) Planning (Analyze Tasks, Goal Setting)
2) Performing Tasks and Monitoring Progress
3) Appraising (Reflection, Regulation, Adaptation)

Panadero E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, *8*, 422. https://doi.org/10.3389/fpsyg.2017.00422

SRL in History Courses

* Created a flexible design that promoted student agency, ownership, and capability (student-centered over traditional instructivist design)
* Identified learning outcomes and aligned content at the start
* Created assignment banks with common rubrics to assess progress
* Mixed formative and summative assessment options

SRL in History Courses

Students completed the following tasks:

1) Reviewed unit content, mapped out path, set goals (could follow instructor-suggested path or their own)

2) Completed different activities (more of following slides)

3) Evaluated learning pathway, reflected on choices, then repeated for following unit (helping them take ownership of learning)

Assignment Banks

https://assignments.ds106.us/

Assignment Banks

Students could:

1) Complete all recommended activities or choose their own path

2) If choosing their own, they had to add up the total number of points offered by different formative and summative assessments
   a) Had the option for one larger summative assignment at any point if greater prior knowledge (competency-based model)
   b) If bringing in content from outside of the ourse, they shared what it was when submitting activities with links

Assignment Banks

Students could:

3) Change initial pathway as needed (personal issues, struggling, etc.)

4) Work in groups or individually

Note - There were a few required activities for departmental purposes

Assignment Banks

Sample Constitutional Convention Activity

- Common rubric that assessed understanding of influences (contextual, individuals, groups), different plans and their elements, etc.
- Submission examples include:
  - Graphic novel
  - Claymation video
  - Group acting it out
  - Newspaper front page

Opportunities/Challenges

Opportunities

* Rich content => students excited about their work and going above and beyond
* Reduces number of throw-away assignments
* Helps them be self-directed learners for life beyond the classroom

Challenges

* Requires a lot of initial planning
* Requires scaffolding students (anticipating issues)
* Giving up control

References

Published

Crosslin, M., & Dellinger, J. T. (2015). Lessons learned while designing and implementing a multiple pathways xMOOC + cMOOC. In D. Rutledge & D. Slykhuis (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2015* (pp. 250-255). Chesapeake, VA: Association for the Advancement of Computing in Education. Retrieved from https://www.learntechlib.org/primary/p/149999/

Crosslin, M., Dellinger, J. T., Joksimovic, S., Kovanovic, V., & Gasevic, D. (2018). Customizable modalities for individualized learning: Examining patterns of engagement in dual-layer MOOCs. *Online Learning Journal, 22*(1), 19-38. http://dx.doi.org/10.24059/olj.v22i1.1080

Crosslin, M., Dellinger, J. T., Milikic, N., Jovic, I., & Breuer, K. (2019). Determining learning pathway choices utilizing process mining analysis on clickstream data in a traditional college course. In J. Cunningham, N. Hoover, S. Hsiao, G. Lynch, K. McCarthy, C. Brooks, R. Ferguson, & U. Hoppe (Eds.), *Companion Proceedings of the 9th International Conference on Learning Analytics and Knowledge* (pp. 231-232). Tempe, AZ: Society for Learning Analytics Research. Retrieved from http://solar.quadsimia.biz/wp-content/uploads/2019/08/LAK19_Companion_Proceedings.pdf

Panadero E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, *8*, 422. https://doi.org/10.3389/fpsyg.2017.00422

References

Resources

Crosslin, M. (2020). Research, reviews, and posts about self-mapped learning pathways. Retrieved from https://mattcrosslin.com/pathways/

Levine, A. (2020). ds106 assignment bank. Retrieved from https://assignments.ds106.us/

Recent Conference Papers (since 2016)

Crosslin, M., & Dellinger, J. T. (Accepted). *The chopped heutagogy challenge: Can learning pathways be designed to allow for self-determined learning options?* OLC Innovate 2020, Chicago, IL.

Crosslin, M., & Dellinger, J. T. (2016, October). *Customizable modality pathway courses: Research results and design implications of empowering learner choice*. Presented at the Learning with MOOCs III Conference, Philadelphia, PA.

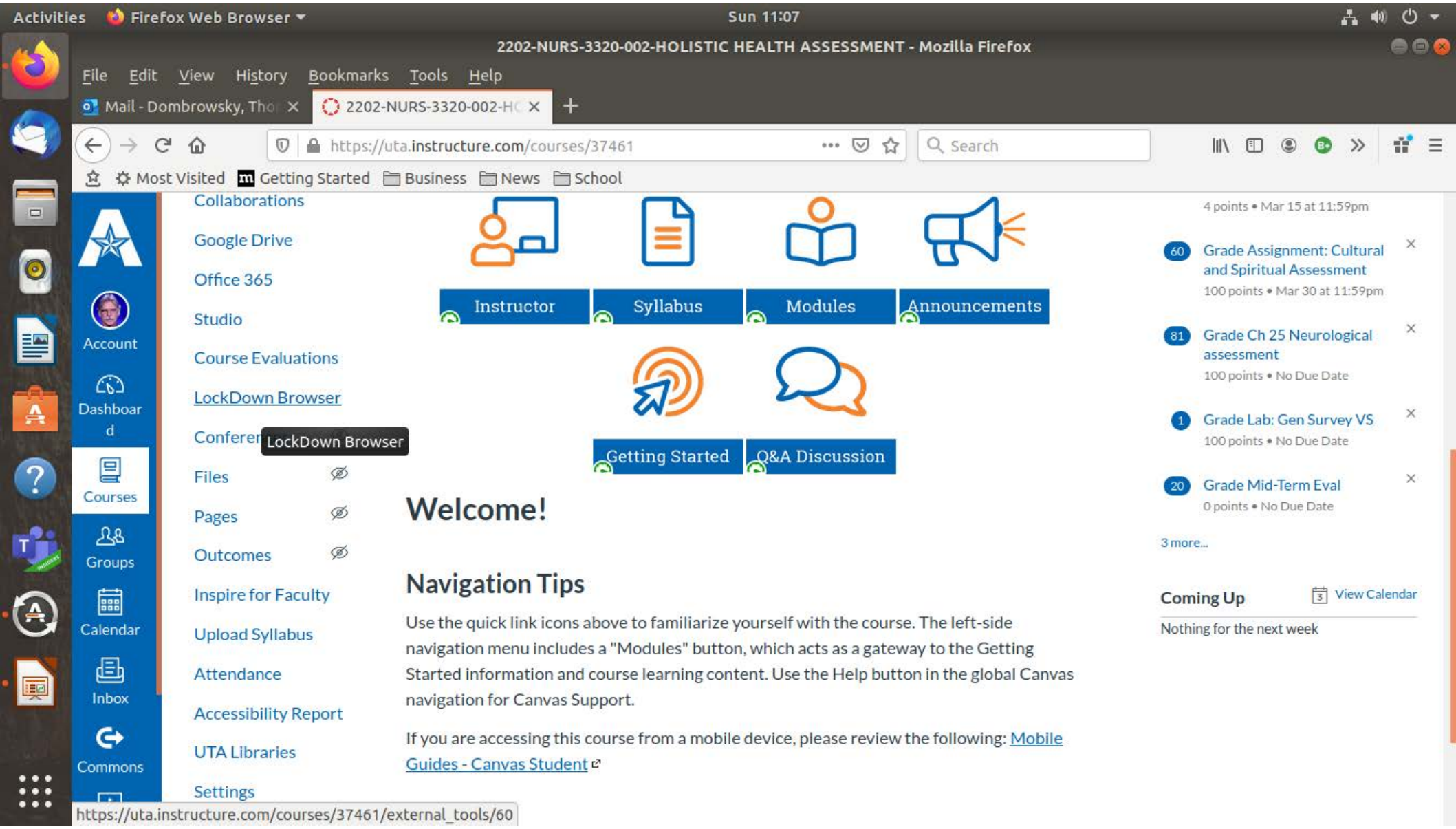
Crosslin, M., Dellinger, J. T., & Breuer, K. (Accepted). *Deploying customizable learning pathways in online university courses: A case study from history courses at a public university*. OLC Innovate 2020, Chicago, IL.

Crosslin, M., Dellinger, J. T., & Breuer, K. (2018, April). *Self-mapped learning pathways: Researching tools that enable individualized heutagogical competency-based learning*. Presented at the OLC Innovate Conference, Nashville, TN.

Crosslin, M., Dellinger, J. T., Milikic, N., Jovic, I., & Breuer, K. (2019, March). *Determining learning pathway choices utilizing process mining analysis on clickstream data in a traditional college course*. Presented at the 9th International Learning Analytics and Knowledge Conference, Tempe, AZ.

Using Respondus Lockdown Browser

By Thomas Dombrowsky, RN, PhD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100 points • Mar 30 at 11:59pm
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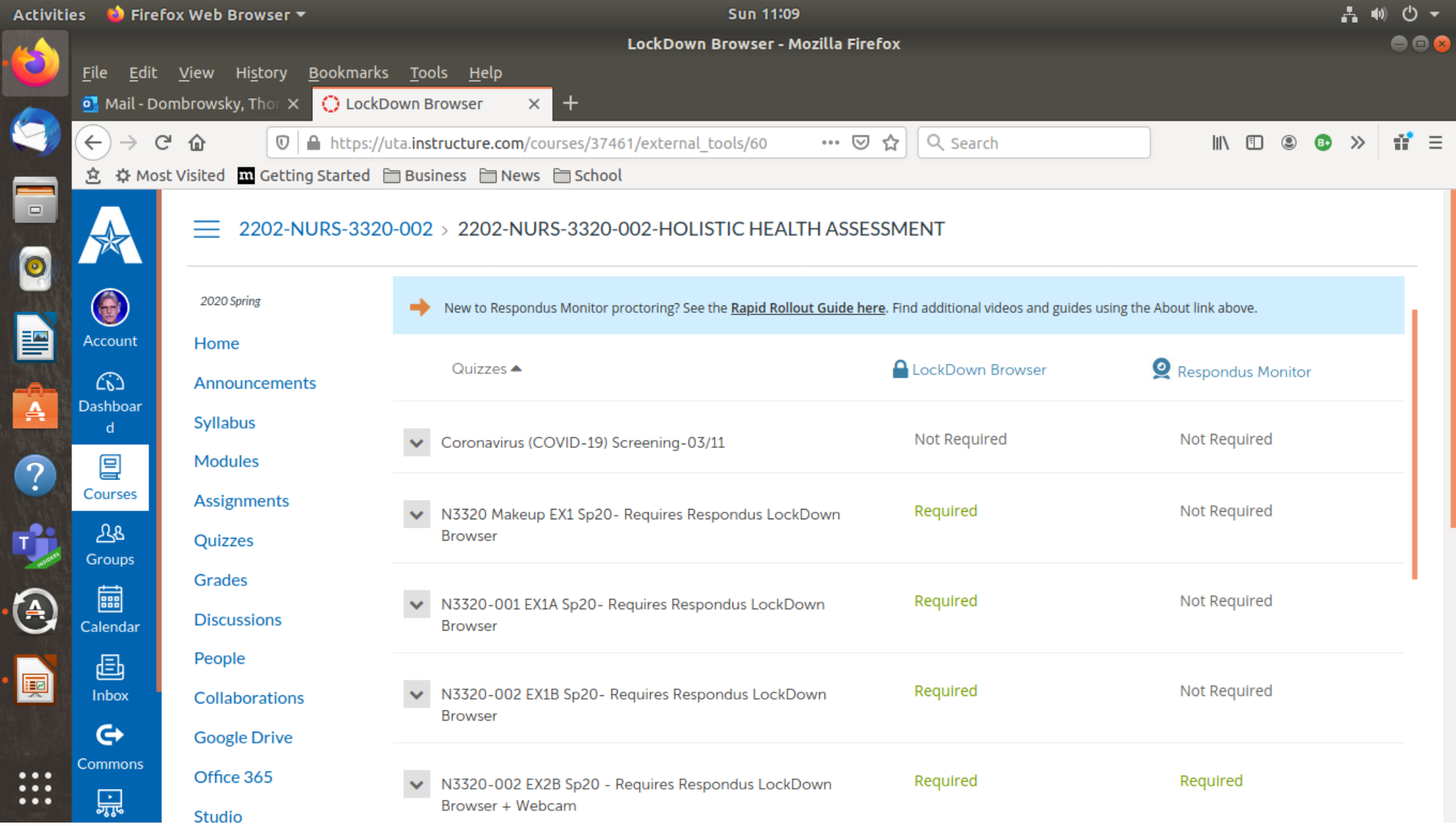
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N3320-001 EX1A Sp20- Requires Respondus LockDown Browser
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N3320-002 EX1B Sp20- Requires Respondus LockDown Browser
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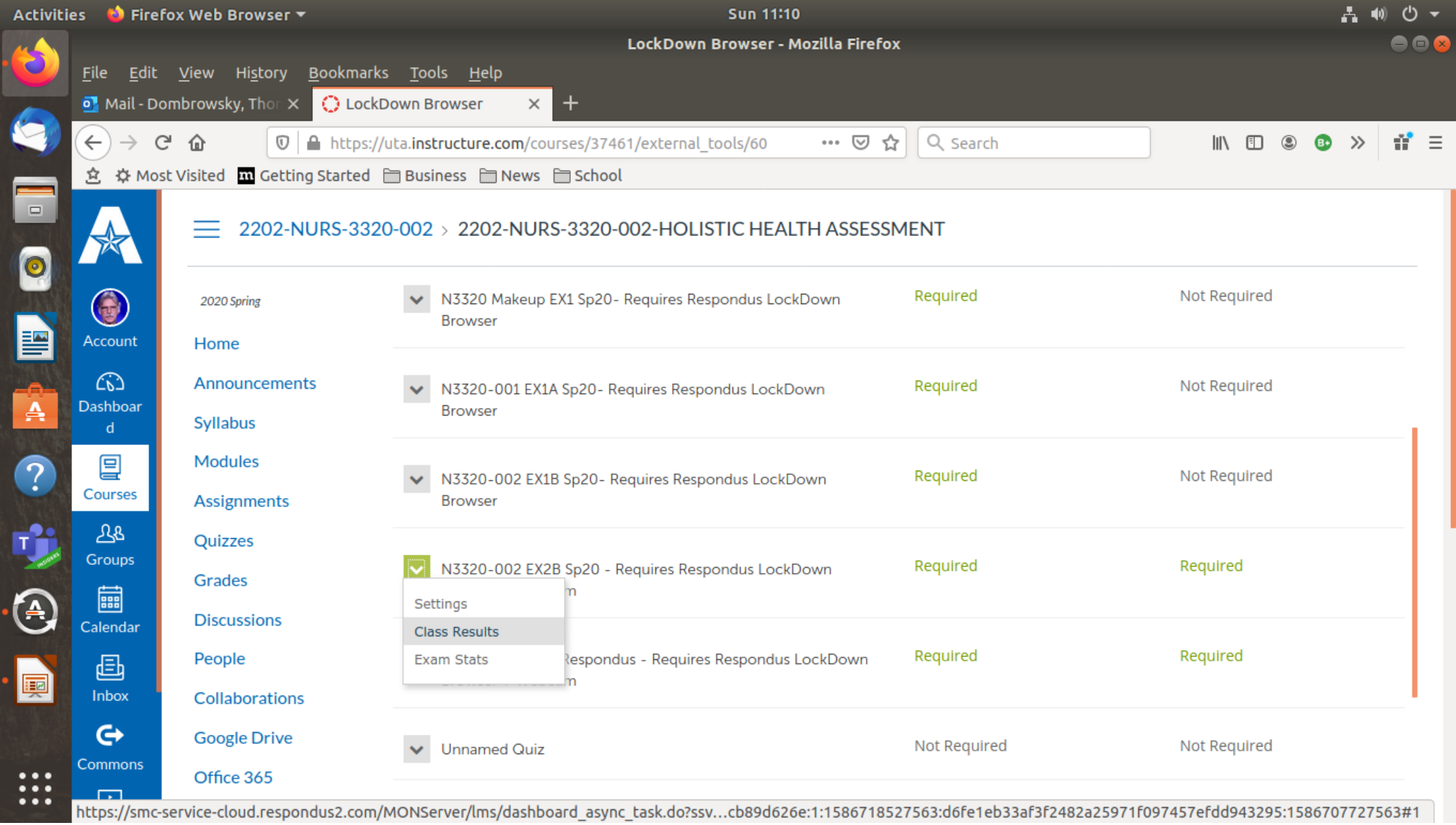
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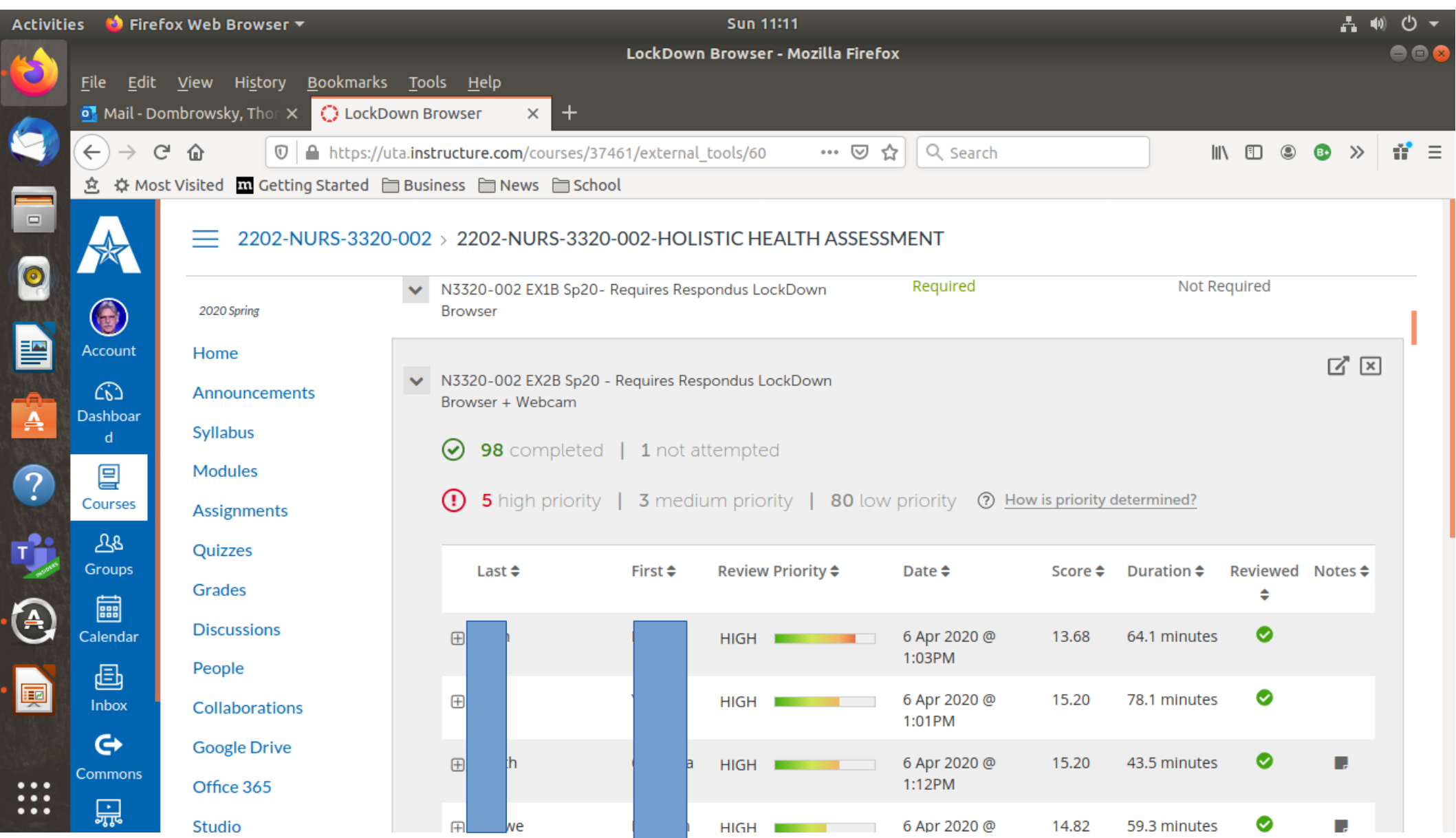
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98 completed | 1 not attempted
5 high priority | 3 medium priority | 80 low priority
How is priority determined?
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HIGH
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98 completed | 1 not attempted

5 high priority | 3 medium priority | 80 low priority How is priority determined?

Last	First	Review Priority	Date	Score	Duration	Reviewed	Notes
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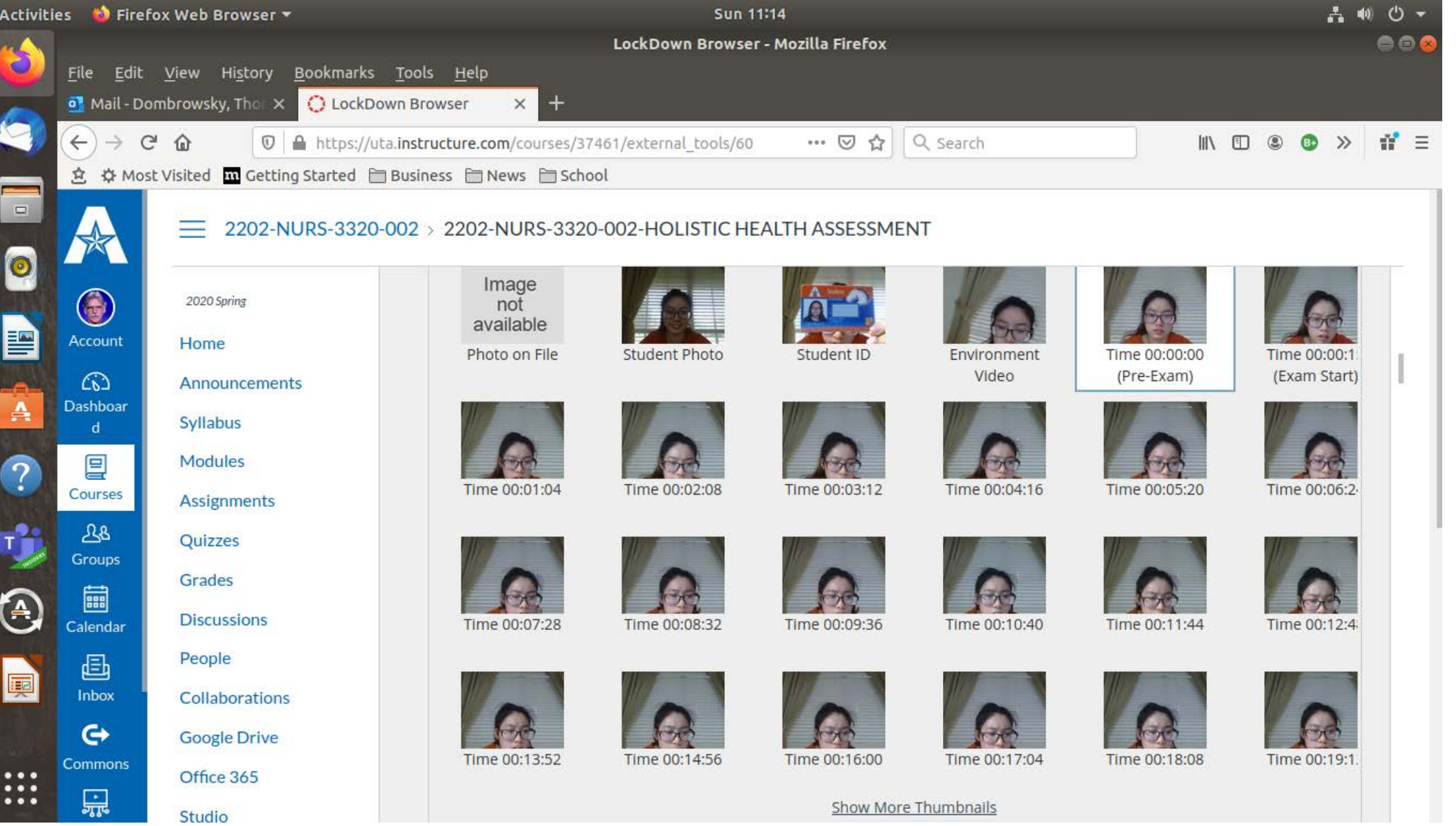
Priority for Review : HIGH [more details]

Number of Flags: 12

Total Flagged Time: 00:03:52

Facial Detection: 67%

Show: Flags Milestones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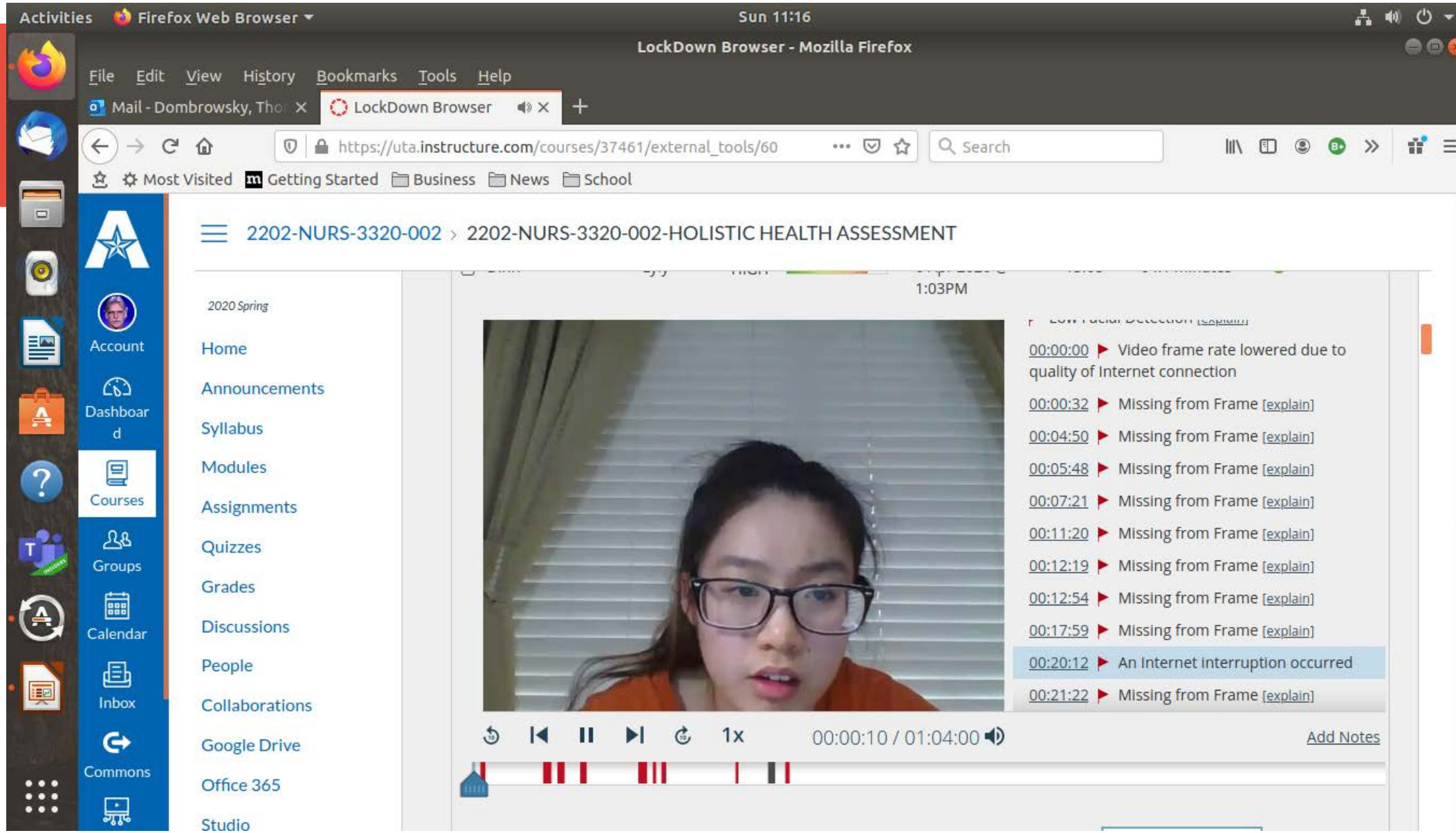
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00:04:50 Missing from Frame [explain]
00:05:48 Missing from Frame [explain]
00:07:21 Missing from Frame [explain]
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00:20:12 An Internet interruption occurred
00:21:22 Missing from Frame [explain]
1x
00:00:10 / 01:04:00
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Important Tips

1) Flags aren't cheating. Flagged events and the Review Priority value don't determine whether a student has cheated or not. Rather, they are tools to help identify suspicious activities, anomalies, or situations where the data is of too low of a quality to analyze.

2) Facial detection is important. Several flagging events rely heavily on facial detection technology. If the face cannot be detected in the video, it isn't possible to determine if the test taker is "missing" or "different". If a student's face is turned away from the webcam or heavily cropped in the video (e.g. you can only see the student's eyes and forehead), facial detection rates will drop. Other things that affect facial detection rates are baseball caps, backlighting, very low lighting, hands on the face, and certain eye glasses.

3) There are more "false positives" than "true positives." Flags that rely on facial detection technology are often incorrect (known as a false positive). If a student is flagged as "missing" but he/she is still visible in the frame, this would be considered a false positive. A "true positive" is a suspicious behavior that is correctly identified by the flagging system. Our goal is to reduce the false positive flags as much as possible, without missing the "true positive" events. It's not a perfect science — yet.

4) Garbage in, garbage out. You can achieve immediate improvement with automated flags that rely on facial detection by having students produce better videos. Provide these simple guidelines to students to help them create higher quality videos so the flagging system works better.

- Avoid wearing baseball caps or hats that extend beyond the forehead
- If using a notebook computer, place it on a firm surface like a desk or table, not your lap.
- If the webcam is built into the screen, avoid making screen adjustments after the exam starts. A common mistake is to push the screen back, resulting in only the top portion of the face being recorded.
- Don't lie down on a couch or bed while taking an exam. There is a greater chance you'll move out of the video frame or change your relative position to the webcam.
- Don't take an exam in a dark room. If the details of your face don't show clearly during the webcam check, the automated video analysis is more likely to flag you as missing.
- Avoid backlighting situations, such as sitting with your back to a window. The general rule is to have light in front of your face, not behind your head.
- Select a distraction-free environment for the exam. Televisions and other people in the room can draw your attention away from the screen. Other people that come into view of the webcam may

Giving Tests On-Line that Include Problem-Solving

Tests in fields such as science, math, and engineering often include a portion that involves solving problems using equations and calculations. Portions of the test that cover conceptual questions and problem-solving can be given separately. This allows LockDown Browser/Respondus Monitor to be used on the conceptual part. The LockDown Browser/Respondus Monitor cannot, however, be used on the problem-solving part if you want to see students' equations and calculations.

Conceptual Portion

1. Various Canvas quiz question types can be used for the conceptual portion (e.g. multiple choice, short answer, fill in the blank, true-false), with the LockDown Browser (no access to materials besides the quiz) and Respondus Monitor (takes a video of student taking the quiz, which the instructor may see).

2. Have the students do a trial quiz before the day of the actual quiz, to work out technical difficulties. Common issues:
    - Students with Macs need to install the Mac version of the LockDown Browser.
    - To do the quiz, students must access Canvas through the LockDown Browser software, not the usual way.

3. If you have students with computers without cameras, they can use the LockDown Browser by itself.

    Alternatively, consider giving questions that require students to demonstrate understanding/aren't as amenable to cheating (**"give an example," "compare," "contrast"**).

    For example, rather than "State the law of conservation of mass," use the question, "**Give an example** of the law of conservation of mass."

Problem-Solving Portion

1. For the problem-solving portion, choose "File Upload Question" quiz question type in Canvas. Students can then scan in their work or take a picture of their work and upload it. The LockDown Browser can't be used because then students won't be able to upload their work.

2. Have the students do a trial upload using a "File Upload Question" before the day of the actual test, to work out technical difficulties.

3. Consider giving students a formula sheet. This will level the playing field so that students disinclined to cheat will not be at a disadvantage.

4. Limit the time so that students will need to know what they are doing to work the problems within the time limit (even though they have the formula sheet). This is the same approach used in the Engineer-In-Training and Professional Engineering exams (formulas provided but time limited).
    - If you have differently-abled students that require extended test time, you can assign their quiz separately with a longer time.

CRTLE Assessment Seminar

April 13, 2020

Two Tiered Assessments and Assessment Efficacy

Ann Cavallo, Ph.D.

Assistant Vice Provost and Director, CRTLE

Distinguished University Professor of Science Education

Important Test # 1

The Montillation of Traxoline

It is very important that you learn about traxoline. Traxoline is a new form of zionter. It is montilled in Ceristanna. The Ceristannians gristerlate large amounts of fevon and then brachter it to quasel traxoline. Traxoline may well be one of our most lukized snezlaus in the future because of our zionter lescelidge.

Directions: Answer the following questions in complete sentences. Be sure to use your best handwriting.

1. What is traxoline?

a) a new form of zionter
b) a montilled rock
c) a bird
d) a goat

2. Where is traxoline montilled?

a) Zionter
b) Ceristanna
c) France
d) Kentucky

3. How is traxoline quaselled?

a) By cooking it
b) By mixing it with olive oil
c) By gristerlating large amounts of fevon and then brachtering it
d) All of the above

4. Why is it important to know about traxoline?

a) It may solve world hunger
b) It may be worth a fortune someday
c) It may be one of our most lukized snezlaus in the future because of our zionter lescelidge
d) Both a and b above

(attributed to the insight of Judy Lanier)

CLASSROOM TEST OF

SCIENTIFIC REASONING

Multiple Choice Version

Directions to Students:

This is a test of your ability to apply aspects of scientific and mathematical reasoning to analyze a situation to make a prediction or solve a problem. Make a dark mark on the answer sheet for the best answer for each item. If you do not fully understand what is being asked in an item, please ask the test administrator for clarification.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

Revised Edition: August 2000 by Anton E. Lawson, Arizona State University. Based on: Lawson, A.E. 1978. Development and validation of the classroom test of formal reasoning. *Journal of Research in Science Teaching*, 15(1): 11-24.

1. Suppose you are given two clay balls of equal size and shape. The two clay balls also weigh the same. One ball is flattened into a pancake-shaped piece. *Which of these statements is correct?*

   a. The pancake-shaped piece weighs more than the ball
   b. The two pieces still weigh the same
   c. The ball weighs more than the pancake-shaped piece

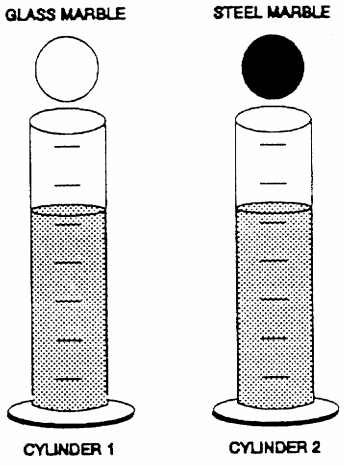
2. *because*

   a. the flattened piece covers a larger area.
   b. the ball pushes down more on one spot.
   c. when something is flattened it loses weight.
   d. clay has not been added or taken away.
   e. when something is flattened it gains weight.

3. To the right are drawings of two cylinders filled to the same level with water. The cylinders are identical in size and shape.

   Also shown at the right are two marbles, one glass and one steel. The marbles are the same size but the steel one is much heavier than the glass one.

   When the glass marble is put into Cylinder 1 it sinks to the bottom and the water level rises to the 6th mark. *If we put the steel marble into Cylinder 2, the water will rise*

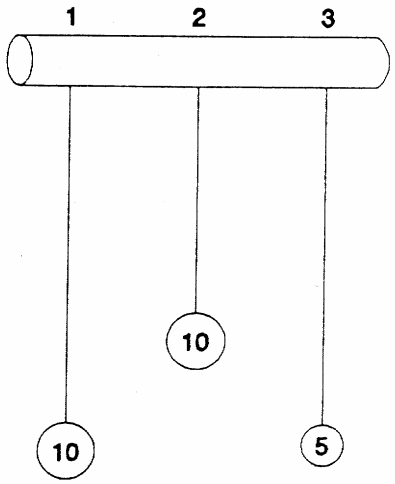


   a. to the same level as it did in Cylinder 1
   b. to a higher level than it did in Cylinder 1
   c. to a lower level than it did in Cylinder 1

4. *because*

   a. the steel marble will sink faster.
   b. the marbles are made of different materials.
   c. the steel marble is heavier than the glass marble.
   d. the glass marble creates less pressure.
   e. the marbles are the same size.

9. At the right are drawings of three strings hanging from a bar. The three strings have metal weights attached to their ends. String 1 and String 3 are the same length. String 2 is shorter. A 10 unit weight is attached to the end of String 1. A 10 unit weight is also attached to the end of String 2. A 5 unit weight is attached to the end of String 3. The strings (and attached weights) can be swung back and forth and the time it takes to make a swing can be timed.



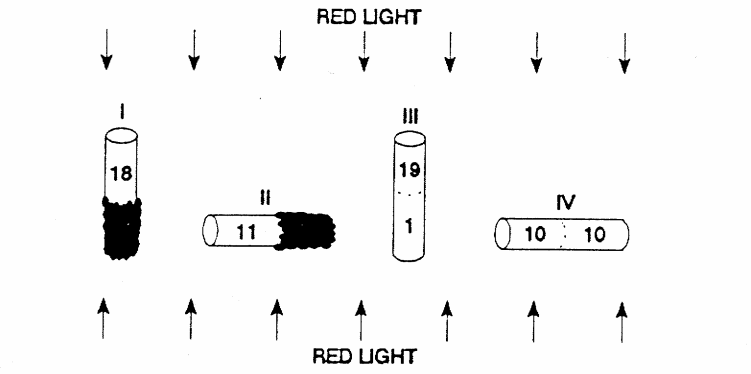
Suppose you want to find out whether the length of the string has an effect on the time it takes to swing back and forth. *Which strings would you use to find out?*

a. only one string
b. all three strings
c. 2 and 3
d. 1 and 3
e. 1 and 2

10. *because*

a. you must use the longest strings.
b. you must compare strings with both light and heavy weights.
c. only the lengths differ.
d. to make all possible comparisons.
e. the weights differ.

11. Twenty fruit flies are placed in each of four glass tubes. The tubes are sealed. Tubes I and II are partially covered with black paper; Tubes III and IV are not covered. The tubes are placed as shown. Then they are exposed to red light for five minutes. The number of flies in the uncovered part of each tube is shown in the drawing.



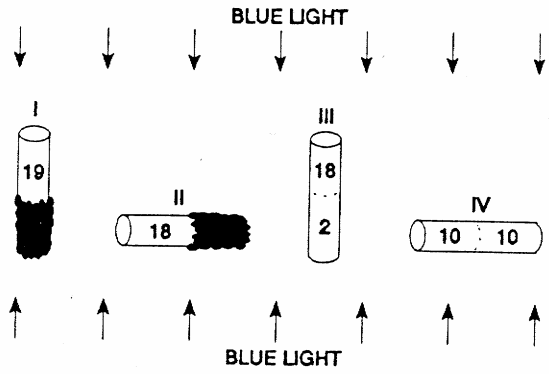
This experiment shows that flies respond to (respond means move to or away from):

a. red light but not gravity
b. gravity but not red light
c. both red light and gravity
d. neither red light nor gravity

12. *because*

a. most flies are in the upper end of Tube III but spread about evenly in Tube II.
b. most flies did not go to the bottom of Tubes I and III.
c. the flies need light to see and must fly against gravity.
d. the majority of flies are in the upper ends and in the lighted ends of the tubes.
e. some flies are in both ends of each tube.

13. In a second experiment, a different kind of fly and blue light was used. The results are shown in the drawing.



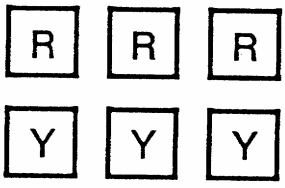
These data show that these flies respond to (respond means move to or away from):

a. blue light but not gravity
b. gravity but not blue light
c. both blue light and gravity
d. neither blue light nor gravity

14. *because*

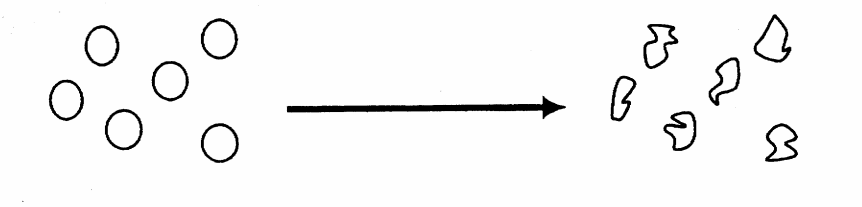
a. some flies are in both ends of each tube.
b. the flies need light to see and must fly against gravity.
c. the flies are spread about evenly in Tube IV and in the upper end of Tube III.
d. most flies are in the lighted end of Tube II but do not go down in Tubes I and III.
e. most flies are in the upper end of Tube I and the lighted end of Tube II.

15. Six square pieces of wood are put into a cloth bag and mixed about. The six pieces are identical in size and shape, however, three pieces are red and three are yellow. Suppose someone reaches into the bag (without looking) and pulls out one piece. *What are the chances that the piece is red?*



a. 1 chance out of 6
b. 1 chance out of 3
c. 1 chance out of 2
d. 1 chance out of 1
e. cannot be determined

23. A student put a drop of blood on a microscope slide and then looked at the blood under a microscope. As you can see in the diagram below, the magnified red blood cells look like little round balls. After adding a few drops of salt water to the drop of blood, the student noticed that the cells appeared to become smaller.



Magnified Red Blood Cells After Adding Salt Water

This observation raises an interesting question: Why do the red blood cells appear smaller?

Here are two possible explanations: I. Salt ions (Na^+ and Cl^-) push on the cell membranes and make the cells appear smaller. II. Water molecules are attracted to the salt ions so the water molecules move out of the cells and leave the cells smaller.

To test these explanations, the student used some salt water, a very accurate weighing device, and some water-filled plastic bags, and assumed the plastic behaves just like red-blood-cell membranes. The experiment involved carefully weighing a water-filled bag, placing it in a salt solution for ten minutes and then reweighing the bag.

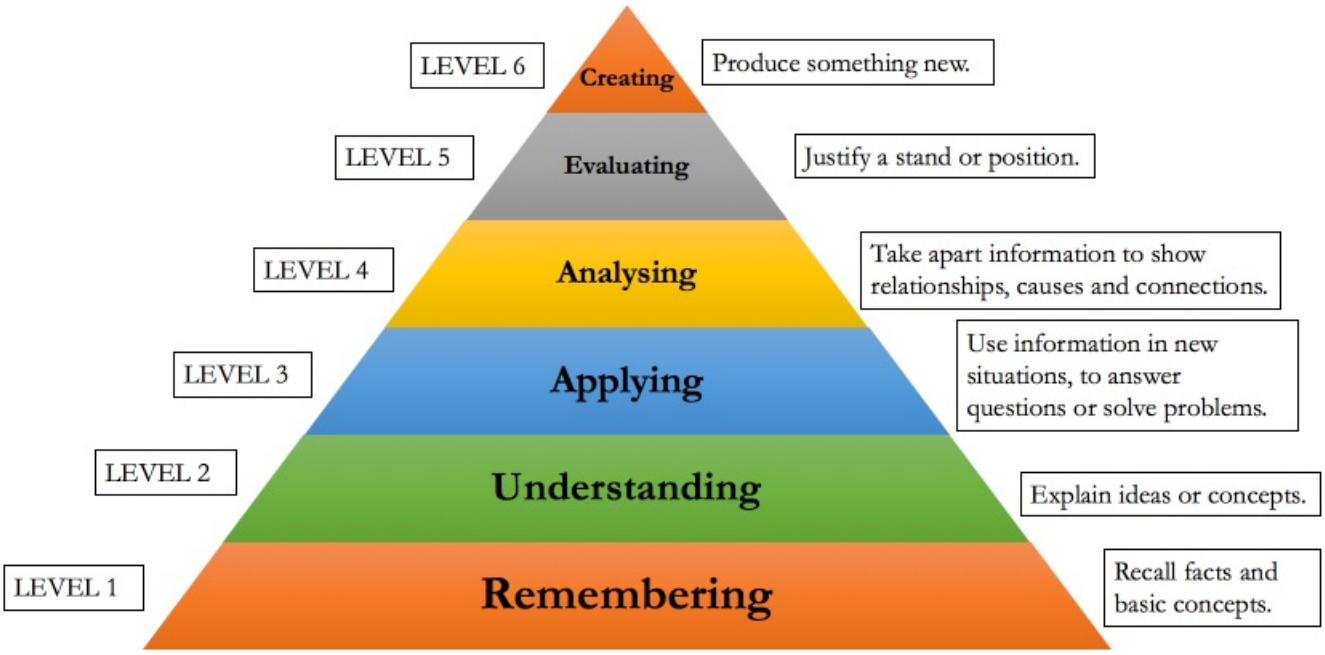
What result of the experiment would best show that explanation I is probably wrong?

a. the bag loses weight
b. the bag weighs the same
c. the bag appears smaller

24. *What result of the experiment would best show that explanation II is probably wrong?*

a. the bag loses weight
b. the bag weighs the same
c. the bag appears smaller

Blooms Taxonomy for Objectives and Assessments



From: https://www.apu.edu/live_data/files/333/blooms_taxonomy_action_verbs.pdf

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

From: http://academic.son.wisc.edu/wistrec/net/multiplechoicetext.html

Writing Multiple-Choice Questions

Advantages

- Allow for assessment of a wide range of learning objectives
- Objective nature limits scoring bias
- Students can quickly respond to many items, permitting wide sampling and coverage of content
- Difficulty can be manipulated by adjusting similarity of distractors
- Efficient to administer and score
- Incorrect response patterns can be analyzed
- Less influenced by guessing than true-false

Disadvantages

- Limited feedback to correct errors in student understanding
- Tend to focus on **low level learning**
- Results may be biased by reading ability or test-wiseness
- Development of good items is time consuming
- Measuring ability to organize and express ideas is not possible

Formatting Tips

- Use 3-5 responses in a vertical list under the stem.
- Put response options in a logical order (chronological, numerical), if there is one, to assist readability.

Writing Tips

- Use clear, precise, simple language so that wording doesn't effect students' demonstration of what they know (avoid humor, jargon, cliché).
- Each question should represent a complete thought and be written as a coherent sentence.
- Avoid absolute or vague terminology (all, none, never, always, usually, sometimes).
- Avoid using negatives; if required, highlight them.
- Assure there is only one interpretation of meaning and one correct or best response.
- Stem should be written so that students would be able to answer the question without looking at the responses.

- All responses should be written clearly, approximately homogeneous in content, length and grammar.
- Make distractors plausible and equally attractive for students who do not know the material.
- Ensure stems and responses are independent; don't supply or clue the answer in a distractor or another question.
- Avoid "all of the above" or "none of the above" when possible, and especially if asking for the best answer.
- Include the bulk of the content in the stem, not in the responses.
- The stem should include any words that would be repeated in each response.

Examples

Critque the following

- As a public health nurse, Susan tries to identify individuals with unrecognized health risk factors or asymptomatic disease conditions in populations. This type of intervention can best be described as

A. case management
B. health teaching
B. advocacy
D. screening
E. none of the above

This item should be revised. It should not have "none of the above" as a choice if you are asking for the "best" answer.

- Critical pedagogy

A. is an approach to teaching and learning based on feminist ideology that embraces egalitarianism by identifying and overcoming oppressive practices.
B. is an approach to teaching and learning based on sociopolitical theory that embraces egalitarianism through overcoming oppressive practices.
C. is an approach to teaching and learning based on how actual day-to-day teaching/learning is experienced by students and teachers rather than what could or should be experienced.
D. is an approach to teaching and learning based on increasing awareness of how dominant patterns of thought permeate modern society and delimit the contextual lens through which one views the world around them.

This item should be revised because the repetitive wording should be in the stem. So the stem should read "Clinical pedagogy is an approach to teaching and learning based on:"

- Katie weighs 11 pounds. She has an order for ampicillin sodium 580 mg IV q 6 hours. What is her daily dose of ampicillin as ordered?

A. 1160 mg
B. 1740 mg
C. 2320 mg
D. 3480 mg

This example is well written and structured.

- The research design that provides the best evidence for a cause-effect relationship is an:

A. experimental design
B. control group
C. quasi-experimental design
D. evidence-based practice

This example contains a grammatical cue and grammatical inconsistency. Additionally, all distractors are not equally plausible.

- The nurse supervisor wrote the following evaluation note: Carol has been a nurse in the post-surgical unit for 2 years. She has good organizational and clinical skills in managing patient conditions. She has a holistic grasp of situations and is ready to assume greater responsibilities to further individualize care.

Using the Dreyfus model of skill acquisition, identify the stage that best describes Carol's performance.

A. Novice
B. Advanced beginner
C. Competent
D. Proficient
E. Expert

This is a good example.

Multiple choice questions are commonly used in assessments because of their objective nature and efficient administration. To make the most of these advantages, it's important to make sure your questions are well written.

References:

Bosher, S. (2003). Linguistic bias in multiple-choice nursing exams. Nursing Education Perspectives, 24(1), 25-34.

Case, S. M. & Swanson, D. B. (2003). Constructing written test questions for the basic and clinical sciences, 3rd edition (revised). Philadelphia: National Board of Medical Examiners. http://www.nbme.org/about/itemwriting.asp

Clegg, V. L. & Cashin, W. E. Improving multiple-choice tests. Idea paper No. 16, Center for Faculty Evaluation & Development. Manhattan, KS: Kansas State University.

Cohen, A. S. & Wollack, J. A. Handbook on test development: Helpful tips for creating reliable and valid classroom tests. Testing & Evaluation Services, University of Wisconsin-Madison. http://wiscinfo.doit.wisc.edu/exams/instructional_support.htm

Jacobs, L. C. How to write better tests: A handbook for improving test construction skills. Evaluation Services and Testing, Indiana University-Bloomington.
http://www.indiana.edu/~best/write_better_tests.shtml

Park University, Faculty Development web site, Writing Test Items.
http://captain.park.edu/facultydevelopment/writing_test_items.htm

Research: Brenda Kupsch

Design: Eileen Horn

Development funded through a grant from the Health Resources and Service Administration (1D09HP03288-01-00).

Do Females Learn Biological Topics by Rote More than Males?Author(s): Ann M. L. CavalloReviewed work(s):Source: The American Biology Teacher, Vol. 56, No. 6 (Sep., 1994), pp. 348-352Published by: University of California Press on behalf of the National Association of Biology Teachers

Stable URL: http://www.jstor.org/stable/4449850

…in measuring students' accomplishments educators must ensure they are assessing what students truly know and understand, and not their ability to successfully take (or decode) a certain kind of test. Test questions may reflect the often inadvertent gender biases of the test writer (Linn & Hyde 1989; Sudweeks & Tolman 1993). A variety of techniques need to be used to measure students' understandings, including open-ended questions. With open-ended questions such as those used in this study, students' expressions of what they know are not restricted by a list of pre-written questions. Knowledge and understanding may be revealed in students' explanations that may not be "tapped" by forced-choice questions. Educators should consider providing more opportunities for students to express (or demonstrate) their understandings of science. In doing so, one may be surprised to uncover quite complex, insightful and meaningful understandings among students that may have otherwise gone un-recognized.