

Use of automated response systems in the small sized class

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Order of the Session

Introduction to audience response systems (ARS)

Presentation on use of ARS in a low enrollment chemistry class

Workshop of several ARS models

- Peer instruction
- Assessing to Learn (A2L)
- Contingent teaching

Group work and questions

Introduction to audience response systems (ARS)

Audience Response System: uses software and hardware to question (poll) a large group of participants.

Many systems collect data that can be used for assessment and data analysis.

Audience Response Systems

iClicker

eInstruction

Qwizdom

Poll Everywhere

Turning Technologies

Quinnipiac's Clicker initiative

Observation of various instructors using different clicker software in classes

Software, "Clicker" versions and methods of payment were not standardized

Lack of a standardized support model

Spring '11 -decided to see what could be done to support the use of Audience Response Systems across campus

Results - Ideal Features

Easy to use software

Compatible with Mac & PC

Compatible with cell and smart phones

Easy to upgrade to latest edition

Radio frequency instead of infrared

Ability to work with Clickers as well as laptops and mobile technology

Helpful resources and documents for troubleshooting

Results - Ideal Features (cont.)

Software compatible with legacy clickers	PowerPoint Plug In
Easy to use clicker hardware	Small physical size of device
Ability to allow students to see their responses	Display on response system
Ability to export results in CSV/Excel format	Accessible to students with disabilities

Company	Cost	License Model
iClicker	\$45 per clicker- Clicker (Models vary)	Students (or departments) purchase clicker. Instructor downloads software.
eInstruction	\$20 per clicker or \$1500 for clicker set- (models vary)	Students (or departments) purchase clickers. Instructor downloads Software.
Qwizdom	\$70 per clicker,\$500 for instructor software or \$1800 for clicker set – (models vary)	Students purchase a clicker or department purchases a clicker set to share.
Poll Everywhere	Free- \$14 per student/\$349+ per semester for instructor	Students (or departments) purchase a license and students bring a mobile device to the classroom. The entire poll is web-based.
Turning Technologies	\$15 for one year license/\$20 for two year license	Students (or departments) purchase a ResponseWare license. Students can use any device that can connect to the internet. Software is backwards compatible.

Results - Features to Avoid

Hard to use software
(proprietary format)

Devices without a
display

Software that upgrades
without sending a
notification

Clickers that are not
diverse in output
options (i.e. inability to
send responses in
scientific notation)

Large devices

Devices that are not
backwards compatible

Why we chose ResponseWare

Accessible customer
service

Facilitated a "Clicker-free"
campus

On-site training from
company

Helped students utilize
mobile devices for
education

Easy to use software

Backwards compatible
software

Did not limit the amount
of users

Low cost of entry

Works with Blackboard

Free software and updates
for instructors

Growth since 2011

Initial adoption: 300 users in Fall of 2011

800 users in Fall of 2012

In addition to 800 initial users in Fall 2012, departments and individual instructors required students to purchase licenses.

By Spring 2013 student licenses reached 1000

In Spring 2013 Adaption from Schools- SOM/SON

Presentation on use of ARS in a low enrollment chemistry class

CHE 410 -- Inorganic Chemistry

"Largest class ever at QU for this course" -- 14 students! (12 Majors, 1 Minor, 1 HS Major)

lecture only course

students used laptops or phones with internet to answer questions

attempted each of the methods which will be demonstrated in this presentation to compare student achievement and interest

Data on Classroom Responses: Mid-term Exam Results

N=	Question Type	Mean Score
9	Matched	0.7333
12	Similar	0.7389
4	New/control	0.7167

Responses: Mid-term Exam to Final Exam

Retention rates – questions from midterm duplicated on final:

N=	Question type	Mean Score
5	Midterm	0.653333
5	Final	0.785714

Data on Classroom Responses: Final Exam Results

Students achieved an 88.4% correct response rate for final exam questions with a similar in-class version.

Students achieved a 71.4% correct response rate for final exam questions that were new or were not taught with clickers.

Questions remain: How much is because it was familiar? How much is because it was "easier"? How much is because it was "recent"?

Student Evaluation Information

What is your general attitude towards the use of Audience Response Systems in this course?

- Pre-course Survey: 3.36(5) (neutral to somewhat positive)
- Post-course Survey: 3.00(5) (neutral)

What was your preferred style of teaching?

- Contingency Teaching (3.50)
- Peer Instruction (3.29)
- Group Discussion (3.00)

More Student Evaluation Information

What type of impact did Audience Response Systems have on your level of active engagement in a typical meeting of this course?

4.29(5)

1: decreased involvement greatly, 5: increased involvement greatly

To what extent did you find Audience Response System use to be enjoyable to use in this course?

3.43(5)

Questions?

Workshop of several ARS models

- Peer instruction
- Assessing to Learn (A2L)
- Contingent teaching

Logging into ResponseWare

Open a Web Browser

www.RwPoll.com

Enter The Session ID Shown on the screen

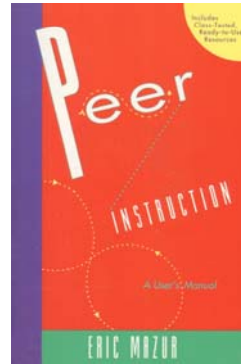
Enter your first and Last name

You should see a message that says “Wait for your presenter to open polling”

Peer instruction

A method built around this structure:

1. ConceptTest / question
2. Individual response
3. Group discussion & response
4. Teacher lecture



<http://mazur.harvard.edu/research/detailspage.php?rowid=8>

ConceptTest

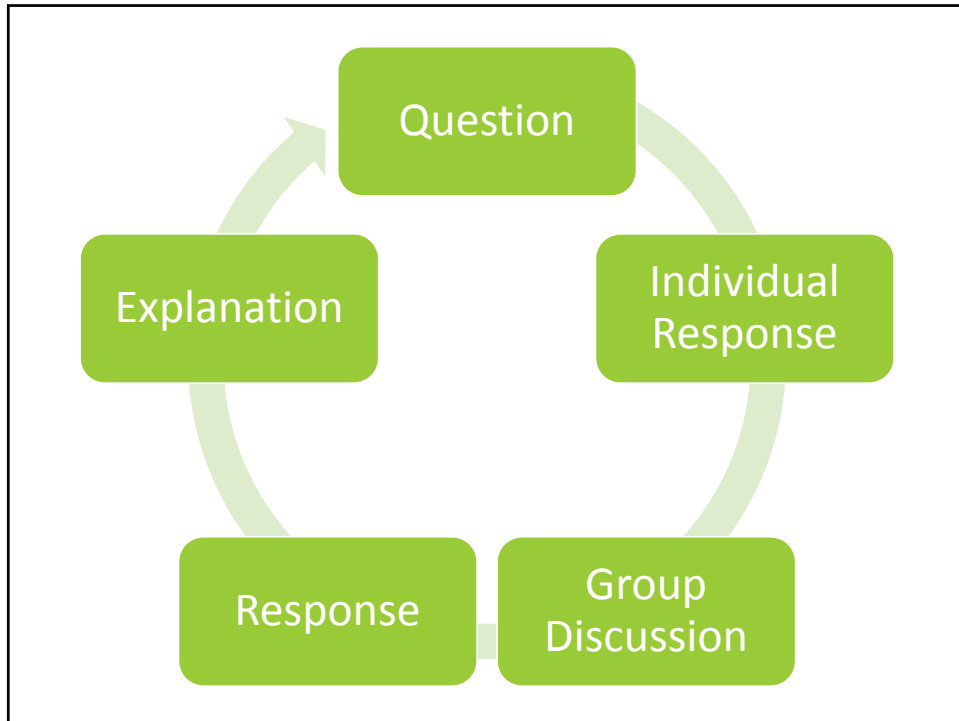
Conceptual

Bloom's: comprehension & application

Short

Multiple Choice

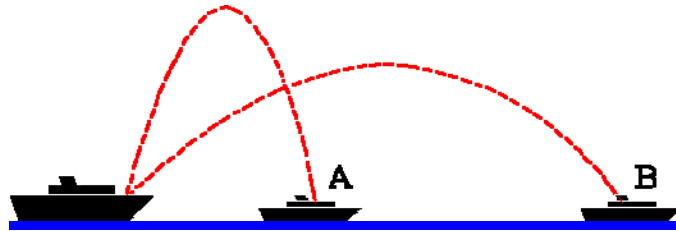
Intermediate difficulty



Concept Test 1

PHYSICS 101: MOTION IN TWO DIMENSIONS

A battleship simultaneously fires two shells at enemy ships. If the shells follow the parabolic trajectories shown, which ship gets hit first?



- A. Ship A
- B. Ship B
- C. They will both be hit at the same time
- D. Need more information

Explanation

$$(t)_{\text{trip}} = 2\sqrt{2h/g}$$

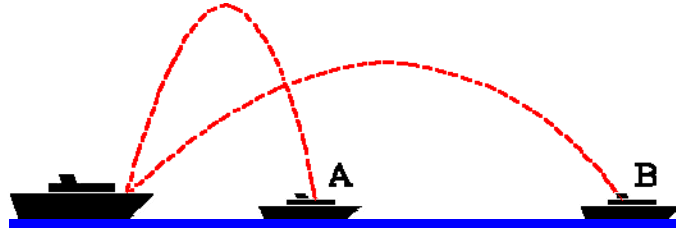
(h) = height of trajectory

(g) = acceleration of gravity (9.81 m/s/s)

(t)trip = total time of rise & fall

As (h) increases, so does the value of (t)trip, so...

A battleship simultaneously fires two shells at enemy ships. If the shells follow the parabolic trajectories shown, which ship gets hit first?



- A. Ship A
- B. Ship B**
- C. They will both be hit at the same time
- D. Need more information

Concept Test 2

SOCIOLOGY OF GENDER: SEX LABELING
OCCUPATIONS

Does the sex labeling of occupations affect supply-side gender discrimination, demand-side gender discrimination, or both?

- A. Supply-side only
- B. Demand-side only
- C. Both
- D. Neither

Concept Test 3

GASTRO NURSING: PAIN EXAMINATION

Mr. Lim was admitted to the hospital due to on-and-off pain that started yesterday. Which method must Nurse Max perform to identify areas of tenderness and swelling?

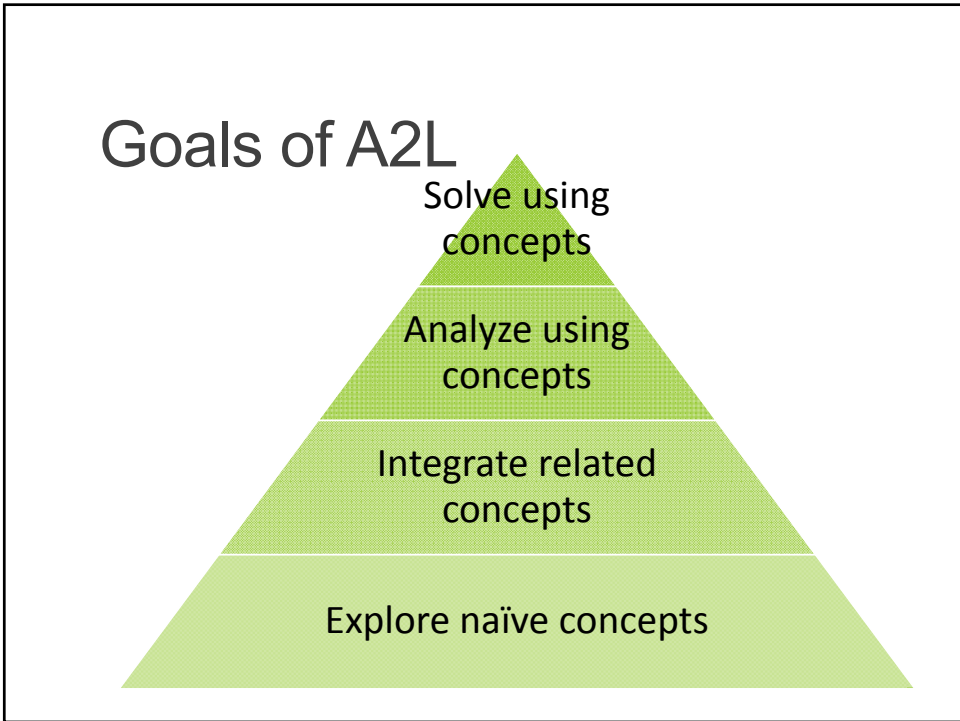
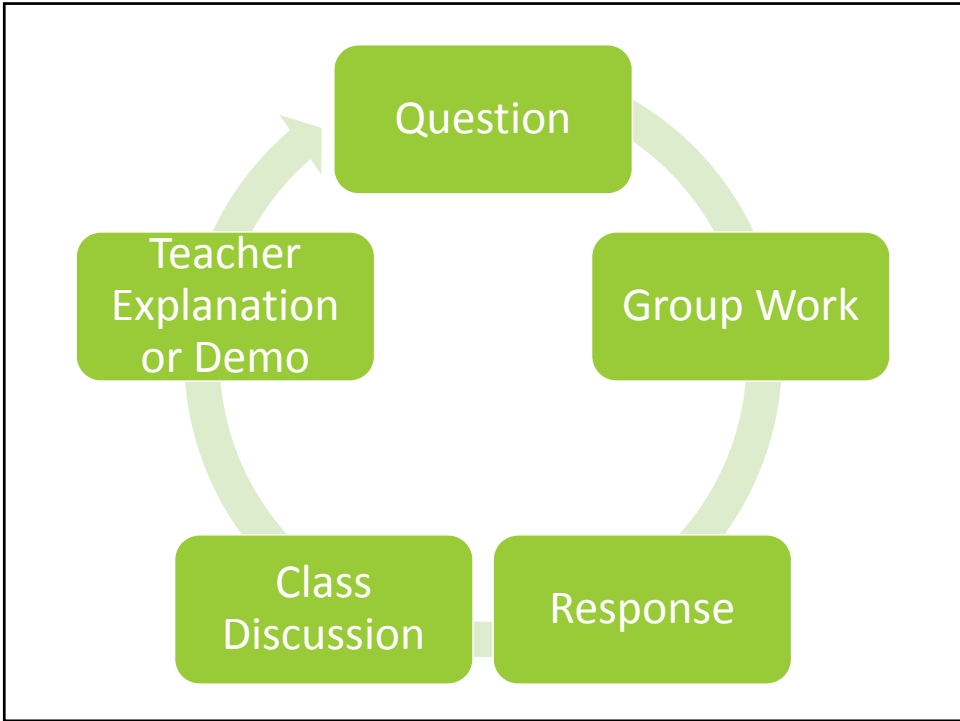
- A. Light palpation
- B. Deep palpation
- C. Direct percussion
- D. Direct fist percussion
- E. Indirect auscultation

Assessing to Learn (A2L)

A method built around this structure:

1. ConceptTest / question
2. Group discussion & response
3. Whole class discussion
4. Teacher lecture /demonstration

<http://www.bedu.com/Publications/UMASS.pdf>



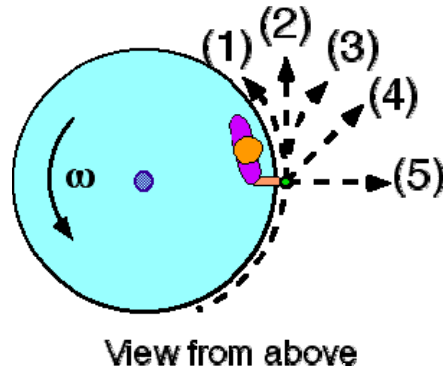
	A2L	Peer Instruction
Pedagogy	Social Constructivism	Constructivism
Response unit	Group	Individual
After response	Class discussion, demo, lecture	Lecture

Concept Test 1

PHYSICS 101: ROTATIONAL MOTION

A child is standing on a merry-go-round holding a rock. If the rock is dropped at the instant shown, which path most nearly represents the path of the rock as seen from above?

- A. Path (1)
- B. Path (2)
- C. Path (3)
- D. Path (4)
- E. Path (5)



Whole Class Discussion

Discuss reasoning

Questions to help rejecting certain options

- What would the motion be if the child kept holding the rock?
- What would have to happen to cause the rock's motion to become perpendicular to its current path?
- What might the path of the rock look like to the child?

Demonstration



Contingent teaching

you are a student in my Inorganic Chemistry class

you were asked to read the chapter about acids
and bases

class begins as follows:

Chapter 6

ACID-BASE AND DONOR-ACCEPTOR CHEMISTRY

Which of the following is an example of an Arrhenius acid?

- 1) HCl in acetic acid
- 2) HCl in water
- 3) both 1 & 2
- 4) neither 1 nor 2

Which of the following is an example of a Brønsted-Lowry acid?

- 1) HCl in acetic acid
- 2) HCl in water
- 3) both 1 & 2
- 4) neither 1 nor 2

Which of the following is an example of a Lewis acid?

- 1) BF_3 in the presence of F^- (to form BF_4^-)
- 2) HCl (g) in the presence of NH_3 (g)
- 3) both 1 & 2
- 4) neither 1 nor 2

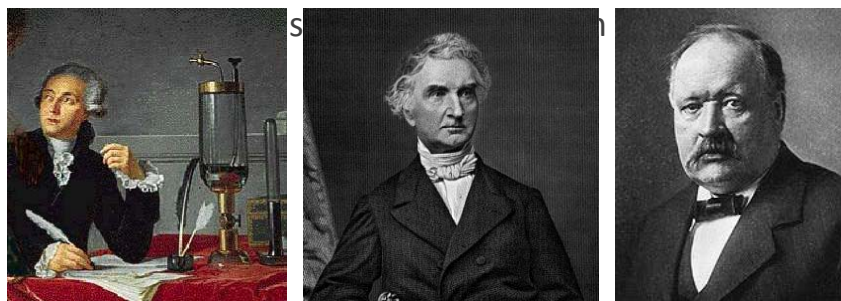
Which of the following is an example of a Lewis acid-base reaction?

- 1) Ca with S to form CaS
- 2) Na with Cl_2 to form NaCl
- 3) both 1 & 2
- 4) neither 1 nor 2

History:

Antoine Lavoisier (~1776): oxide of N, P, S

Justis von Liebig (1838): compound with H replaceable by metal



More Definitions:

Johannes Nicolaus Brønsted & Thomas Martin Lowry (independently in 1923): proton donor

Gilbert Lewis (1923): electron pair acceptor

Christopher Kelk Ingold & Robert Robinson (1932): electrophile (electron pair acceptor)

Hermann Lux & Håkon Flood (1939): oxide ion acceptor

Mikhail Usanovich (1939): electron acceptor

Brønsted-Lowry acid-base chemistry

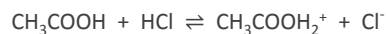
General Chemistry textbooks focus on this definition of an acid and a base.

Acids are proton donors.

Bases are proton acceptors.

Protons are hydrogen ions. (Note: 99.985 % of the natural isotopes of hydrogen are H-1. Making H⁺ out of it results in ONLY a proton present. This does NOT make acid-base chemistry the same as nuclear chemistry!)

e.g., acetic acid is a BASE if it is in the presence of hydrogen chloride (a stronger acid):



What if you aren't working in a solvent system with H⁺?

When do I decide to “step in” and “teach” a topic?

I usually have a sequence of questions that are increasingly complex in nature.

If a substantial amount (even > 20 %) are having difficulty with these questions, then I will step aside from questions and discuss/lecture.

Sometimes I run the course of the sequence and return to it after instruction. (This is another method already discussed.)

Think-Pair-Share

Individually:

- Pick a course and a topic
- Match the topic to an approach

In pairs:

- Share chosen approach
- Design 1 or 2 questions

Share:

- An example question
- Describe thought process

Share 1

Share 2

Share 3

Questions?

Thank You!
