Innovative Assessment in an Online Course for K-8 Science Teachers

Jim Vanides & Jonathan Paver
National Teachers Enhancement Network
Overview

• Intro to the “Science of Sound” course
• Concept Maps
• Discussion Self Assessments
• Lab Notebooks
• Q&A
The Science of Sound

- Offered through Montana State University
- 1 unit masters-level credit for K-8 Teacher Professional Development
- 6 week (8-10 hrs per week), facilitated cohort, scheduled asynchronous online experience
Instructional Design:
- Online reading
- Hands-on science explorations (kits)
- Personal Reflection (science notebooks)
- Small Group & Whole Class discussions
Today is Saturday, May 28

Welcome to our Science of Sound classroom!

A Hands-on, Brain-on Exploration of the Sounds Around Us

Sound is all around us, but how does it work? Why do different objects make different sounds? How can two people singing the same note sound different? In our classroom we will be discussing these and other questions you may have about the Science of Sound. Our objective is that through scientific inquiry you develop a framework for examining sounds, and enhance the teaching of “sound” to your own students.

Below are links to the resources you will be using this week. Every week we will update these links so they are easy to find. We look forward to exploring and sharing together!
What is a Concept Map?

A concept map is a drawing that represents your thinking about a topic. It includes:

- Concept Terms (in circles or on stickie-notes)
- One-way arrows that relate two concepts
- Linking Phrases or words that label the arrows and describe the relationship between a pair of Concept Terms
Concept “Terms” (example)
A “Proposition” (example)

- Frequency Depends on Mass
Why Use Concept Maps?

Concept Maps provide feedback that complements other forms of assessment:

• How students are organizing their understanding
• Highlights what students see as important
• Illuminates misconceptions
Scoring Concept Maps

- Existence of Key Propositions
- Quality of Propositions
  - 3 = Correct & Scientifically stated
  - 2 = Correct, but not scientifically stated
  - 1 = Partially correct
  - 0 = Incorrect or irrelevant
- Complexity
The diagram illustrates the components and relationships involved in sound production:

- **Mass**: Needs a medium to travel through.
- **Energy**: Causes a physical measurement.
- **Frequency**: Is the base of measurement.
- **Sound**: Is a source of all vibrations.
- **Length**: Various forces create the medium.
- **Vibrating String**: Is a source of all energy.
- **Air**: Travels through the medium.
- **Guitar String**: Causes the energy to travel through the medium.

The diagram connects these concepts, showing how they interact to produce sound.
Concept Maps in WebCT

- Students create paper draft, then create a .jpg to submit (PowerPoint, Inspiration, Word, Paint…)
- Drop Box for submissions
- Instructor downloads, scores
- Upload marked up map; add comments
Assignments
To view and grade assignments completed by your students, click **Submission**.

- **First-Draft Concept Map**
  - Availability: October 17, 2004 10:00am - October 24, 2004 11:00pm
  - Cutoff date: November 3, 2004 11:00pm
  - Maximum grade: 3
  - Result: **Submissions**

- **Final Concept Map**
  - Availability: November 7, 2004 5:00am - November 21, 2004 11:00pm
  - Cutoff date: November 28, 2004 11:00pm
  - Maximum grade: 33
  - Result: **Submissions**
### Submissions: Final Concept Map

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Name: [Redacted]

Maximum grade: 33

Due date: November 21, 2004

Status: Submitted November 20, 2004 4:37pm

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Grade Assignment: Final Concept Map

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Maximum grade: 33
Due date: November 21, 2004
Status: Submitted November 20, 2004 4:37pm
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To upload the graded files for this student, click Upload file.

Comments: [Blank]

*Grade: 25 out of 33
Science of Sound Concept Maps

These maps are shared, as is, as a catalyst for more discussion: Which propositions are new to you? Which propositions do you not agree with? What's wrong with using outer space as the backdrop? :)

Thanks to everyone for sharing!
Why?

• Encourage reflection & deeper scientific thinking
• Motivate participation and collaboration
• Receive frequent feedback from students
Welcome to the second week of our class! The focus of this week’s activities is to develop a clear understanding of what a "Sound System" is, and how this framework will get you (and your students) asking a lot of key questions about the sounds you hear all around you.

As with Week 1, we have organized the week into recommended "daily recommended doses".

1. Checklist for Week 2

2. What Do We Know Already About Sound?
   2.1. Create a Concept Map

3. Intro to Sound Systems
   3.1. Read, Reflect, & Discuss: Sound Systems
   3.2. Discuss: Mystery Sound #1

4. Vibrations
   4.1. Explore: "Feel the Frequency"
   4.2. Restoring Old Recordings
   4.3. Optional: Sound Recipes with Excel

5. Measuring Sound
   5.1. Read Articles on Measuring Sound

6. Reflecting on this Week
   6.1. What "sound curiosities" are you thinking about?
   6.2. Discussion Self-Assessment wk2
Discussion Self Assessments

Key Questions:
• Did I respond at least once to each of the questions in this week's activities?
• Did my response(s) raise an original question or issue stemming from the readings or activities?
• Did I post at least two meaningful and constructive responses to other participants' messages?
• Did I complete this self-assessment on time?
• What I found to be most interesting in this week's discussion was...
**Discussion Self-Assessment wk1**

**Name:** WebCT Presentation (Preview)

**Start time:** May 29, 2005 4:36pm

**Number of questions:** 5

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**Question 1** (1.5 points)

*Respond to all the activities’ questions this week?*

Did I respond at least once to each of the questions in this week’s activities?

- a. Yes! (1.5 pts)
- b. Mostly (1.0 pts)
- c. A few (0.5 pts)
- d. I didn’t get around to answering any of this week’s questions. (0 pts)

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**Question 2** (1.5 points)

*Original questions raised?*

Did my response(s) raise an original question or issue stemming from the readings or activities?

- a. Yes, I posted at least one original question in the public discussion area. (1.5 pts)
- b. I posted some questions, but I’m not sure they were original. (1.0 pt)
- c. I thought of some questions and put them in my electronic lab book, but I didn’t share them with the rest of the class. (0.5 pts)
- d. No, I didn’t have any questions this week. (0 pts)

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**Question 3** (1.5 points)

*Meaningful responses?*

Did I post at least two meaningful and constructive responses to other participants’ messages?

- a. Yes! (1.5 pts)

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**Question 4** (0.5 points)

*On time?*

Did I complete this self-assessment on time?

- a. Yes! (0.5 pts)
- b. No... (0 pts)

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**Question 5** (1.0 points)

*Most interesting aspect of this week’s discussion...*  
What I found to be most interesting in this week’s discussion was... (describe what aspect of the discussion was most memorable or meaningful, and earn up to 1 pt)  

**Equation:** [Create equation](#)  
[Equation editor]
Discussion Self Assessment

- Instructor Lessons Learned
  - Discussion Self Assessment helps drive participation
  - The responses to the open-ended question give you real-time course feedback

- Student response
  - “Using the WebCT Quiz Tool is MUCH better than sending you an email…”
Lab Notebooks

Why use “journals” for assessment?

• Encourages private reflection
• Models the practices of real scientists
• Provides instructor with insights regarding individual students
The Scientific Method (realistic)
Lab Notebooks in WebCT

- Private Discussion Topics
- Accessible to Student, TA, and Instructor only
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An “exemplary” (32 to 36 points out of 36) science notebook has frequent and complete entries that document all facets of science inquiry:

- **Science questions** (What you think you know; what you want to know; new questions that are generated as a result of your investigations)
- **Planning and Predicting**
An “exemplary” (32 to 36 points out of 36) science notebook has frequent and complete entries that document all facets of science inquiry:

- **Data collection** (including sketches, diagrams, etc.) and Data analysis (including graphs, if appropriate)
- **Summaries**, conclusions (so far) and thoughts about applications and implications in real-life
- Side-bar ideas related to teaching Sound to your own students
www.vanides2.com/conceptmaps/

- Copy of this presentation
- Template for Concept Map Activity
- NSTA “Science Scope” article on Concept Maps

www.scienceteacher.org (NTEN)
Contacts

Jim Vanides
• jimvanides@att.net

Jonathan Paver
• jpaver@montana.edu