SENDING SIGNALS, MAKING MEANINGFUL CONNECTIONS:
Understanding Digital and Analog Transmissions of Information in Mele and on the Internet

BY KELSEY AMOS

How do humans and computers send signals that contain information?
How do people understand the meanings of songs, poems, or mele?
How do people send secret messages in songs, poems, or mele?
How are websites made?

MIDDLE SCHOOL EIGHTH GRADE

TIMEFRAME 5 CLASS PERIODS/ 1-1.5 HOURS PER CLASS

STANDARD BENCHMARKS AND VALUES

CCSS
LA.8.2.2 Use annotation methods to identify main ideas and important details while reading
LA.8.2.4 Make inferences based on explicit and implied information
LA.8.3.4 Explain literary devices (e.g., satire, allusion, irony)
LA.8.3.5 Explain an opinion about an author’s ideas or message by analyzing conventions of fiction (e.g., plot, character, imagery, motifs, tone, subplots, stock characters)
LA.8.3.6 Explain how previous experience can influence one’s reading of a text and one’s opinion of that text

NGSS
MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]

Nā Honua Mauli Ola
3. Sustain respect for the integrity of one’s own cultural knowledge and provide meaningful opportunities to make new connections among other knowledge systems.
发送信号，建立有意义的联系

**关键技能和概念**
- 学生能够解释模拟信号具有连续值，而数字信号具有离散值。
- 学生能够解释《美乐》或诗歌中的字面意义。
- 学生能够使用 HTML 创建网页上的文本。
- 学生能够使用 HTML 创建链接。
- 学生理解：
  - 波可以用来发送信息，无论是声波还是电磁波。
  - 音乐是一种模拟信号，依赖于声波，而计算机通过电磁波发送数字信号。
  - 文学作品如歌曲、美乐和诗歌可能包含两个层次的意义，一个是字面的，一个是比喻的。
  - “隐含”意味着字面意义或比喻性意义，是夏威夷文学的重要组成部分。
- HTML 是互联网的基础语言，用于制作形成链接的网页。
- 互联网由相互链接的网页构成，类似于我们大脑不断创建思想之间的联系。作者通过尝试引导我们的大脑，当我们听到或阅读一首歌或诗歌时，向我们发送信息。

**标准基准和价值观**

**学习者能够：**
1. 发展对自己文化知识的理解。
2. 实践自己的文化遗产。
3. 扩展和扩展对自身文化视角的理解，通过体验其他文化。
4. 通过应用展示自己文化知识的应用。
5. 分享和展示对不同文化之间共同点的理解。

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ENDURING UNDERSTANDING:
1. Mele and other oral modes of communication transmit information through sound waves using the human body. Digital communication technologies use electromagnetic waves to send digital signals.
2. Writers of songs, poems, and mele make meaning for audiences by using literal language, metaphorical language, references, allusions, and kaona.
3. HTML code is used to make hyperlinks (you probably know them as just “links”) that form a “web” of connections that forms a website, or that branches out to other websites on the internet.

AUTHENTIC PERFORMANCE TASK:
• Build a website that features the student’s chosen or written song/mele/poem with hyperlinks to pages that explains the kaona of a song, mele, or poem, and how the kaona is formed out of metaphorical language and references allusions.
• Explain the pros and cons in writing of transmitting their mele using sound waves (in person, analog) vs. transmitting their mele over the Internet (digital).

AUTHENTIC AUDIENCE:
An audience of parents or other family members will listen to the song first without explanation, and then after viewing the website they’ll give feedback on how their understanding and enjoyment of the work changed.

OTHER EVIDENCE: The underlying HTML code.

LEARNING PLAN
CLASS ONE - SENDING SIGNALS IN DIGITAL AND ANALOG

PREPARATION:
• Prepare group assignments and write down each group’s restrictions.
• Review sound waves and electromagnetic waves.
• Review Videos and set up projection and sound.
• Print out morse code alphabet reference sheet.

RECOMMENDED PRE-ASSIGNMENTS:
• Have students view the following videos as homework. Perhaps include a question worksheet to highlight points of emphasis, noted below.
• Mechanical vs. Electromagnetic Waves.
• Emphasize how sound waves are mechanical, but light waves and radio waves are electromagnetic.
• Digital and Analog technology.
• Make sure students understand that digital signals are good for recording and storing information with precision and without “noise” interference, but analog signals are always necessary for transmitting signals over long distances.
• Alternately, assign as homework any textbook readings or other readings available to you on waves, sound waves, or electromagnetic waves.
IN CLASS:

1. Teacher starts the class by posing essential question #1 (How do humans and computers send signals that contain information?)

2. Teacher breaks students into groups of varying sizes and gives each group their instructions on how they must send a message across the room from one group member to another.
   a. Group 1 has 2 people. They may not use any materials and they can’t see each other or move.
   b. Group 2 has 2 people. They may not speak, but they can move.
   c. Group 3 has 5 people (or however many it would take to form a chain across the room). They may not use any materials, they cannot speak above a whisper, and they cannot move.
   d. Group 4 has 2 people. They may not speak or use any materials besides their phones.
   e. Group 5 has 4 people. They can work together to draw out morse code signals. (Provide a morse code alphabet reference sheet.)
   f. Group 6 has 2 people. They can only sing.

3. Students go through the exercise and each group shows the whole class what they’ve done to solve the communication problem.

4. Teacher links ideas from the exercise to a review of the ideas from the homework videos.
   a. Class discussion should cover written vs. oral methods of sending messages
   b. Sound waves vs. electromagnetic waves, and how each can be used to send information. Topics to discuss might include how our voices make sound waves while radio waves are electromagnetic waves.
   c. Ask students to guess what kinds of waves are used by wireless devices that connect to the internet (one group used these), then explain how wifi is a form of radio waves (electromagnetic).
   d. Analog vs. digital. The morse code group was using using a digital method because they could only use two values—long and short dashes.

5. Teacher starts a debate: Students are asked to go to one side of the room to indicate their guess about whether a certain technology is digital or analog. Give a few students on each side a chance to explain their reasoning before giving the answers. Tell students that as they hear explanations from their classmates, they can choose to move and change sides. Ask whether the following technologies are digital or analog:
   a. Computers (digital)
   b. Radio (analog, unless it’s digital radio!)
   c. Wifi (analog, but it needs a router that converts information back and forth between digital and analog)
   d. Ears (analog, but it converts sound vibrations into electro-chemical signals that your brain reads, so it’s kind of like your ear has its own analog-to-digital converter)
   e. Your voice (analog)
   f. Your brain (neither! It has elements that are similar to both, but we’re still trying to figure out how the brain works.)

6. Come back to a circle and have students discuss what is the best technology for sharing music, and whether it would be better to share a song using digital or analog technologies.
   a. End class with individual writing (or assign for homework) on the questions above.
CLASS TWO - FINDING HIDDEN MEANING

PREPARATION:
- Review literary devices and the meaning of Kaona (perhaps a handout on Kaona would be helpful).
- Set up video of Kaulana Nā Pua.
- Build example website of Kaulana Nā Pua (See Appendix for more on this.)

IN CLASS:
1. Teacher poses essential questions #2 and #3 (How do people understand the meanings of songs, poems, or mele? How do people send secret messages in songs, poems, or mele?) one at a time, leading a class discussion about how authors make meaning, and how hidden meanings could possibly be transmitted.
   a. Topics that students might bring up include: The words of a song, tempo and emotion of the song, metaphors and similes, allusions to other people places or things, double meanings of words.
2. Teacher introduces the ideas that writers of songs, poems, and mele make meaning for audiences by using literal language, metaphorical language, and references or allusions to things outside of the text. Metaphorical language and references/allusions work by making connections or “links” in the minds of the audience. Kaona is the hidden meaning that is formed out of metaphorical language, references/allusions, wordplay, or other literary devices.
   a. Unless students have strong ‘Ōlelo Hawai‘i skills, they will likely guess it is a happy song about Hawai‘i.
3. Teacher shows part of Kaulana Nā Pua video and asks students to speculate as to what they think the song is about based on just hearing the melody and tone.
   b. Discuss literal meaning: What is this song about?
   c. Discuss metaphor: What does “nā pua” mean in the first line?
   d. Discuss references/allusions to the islands in stanza 2: What does stanza 2 mean, and what are the places referred to? (Ex. “moku o Keawe” is Hawai‘i Island)
   e. Discuss kaona by focusing on stanza 4: What is “ka ‘ai kamaha‘o‘o ka ‘āina”? What does it mean that “Ua lawa mākou i ka pōhaku”?
4. Teacher breaks students up into teams (groups of 4) to answer questions in the next part. Show pre-made example website that shows the text of the mele in both Hawaiian and English, with links within the text. Teacher leads discussion and clicks through the links to reveal the answers to her questions.
   a. Discuss literal meaning: What is this song about?
   b. Discuss metaphor: What does “nā pua” mean in the first line?
   c. Discuss references/allusions to the islands in stanza 2: What does stanza 2 mean, and what are the places referred to? (Ex. “moku o Keawe” is Hawai‘i Island)
   d. Discuss kaona by focusing on stanza 4: What is “ka ‘ai kamaha‘o‘o ka ‘āina”? What does it mean that “Ua lawa mākou i ka pōhaku”?
5. End by having the students reconsider the writing they did for homework. Ask them to write again about what they learned about how meanings are different from signals, and whether digital or analog is better for making meaning. Homework is to finalize this and turn it in by a deadline.
6. Assign students additional homework to find a song/mele/poem that they think might have kaona or metaphorical meaning and bring a print out to class.

CLASS THREE - LITERARY ANALYSIS TIME & INTRO TO HTML

PREPARATION:
- Download and install Brackets to the computers students will be using
- It might be helpful to print out an HTML and CSS cheat sheet of basic tags for each student and/or bookmark an easy HTML reference website on the students’ browsers
- It could also be helpful to prepare and assignment sheet of tasks that students can follow as they build their websites
IN CLASS:
1. Break students into groups to share the song/mele/poem that each of them brought in for homework. Have students choose one to analyze together. Give them a firm end time to finish by.
2. Working in their teams, have students annotate the printout of the song as they brainstorm what are the important elements to discuss in order to understand the meaning and kaona of the song.
3. Require that students also brainstorm people such as family members of other teachers, that they can ask about the meaning and kaona of the mele.
4. After the analysis time is up, teacher gathers the whole class together to discuss the ethics of sharing online. Explain how some meanings are meant to be shared publicly, and others are not. Discuss how students should ask their family members or teachers for information, and how they should ask permission about what information can be shared online.
5. Teacher transitions the class. Students break up and go to individual computers. Before computers are turned on, the teacher introduces the idea of how, similar to morse code, computers use many codes to translate information into what we see on the screen. The most basic code is binary.

CLASS FOUR - WORK DAY

IN CLASS:
1. Students break into their groups again and share what they found out from the adults they asked about the mele.
2. Groups make a mock-up of the website they will build to explain the mele, based on all the information that team members have gathered that is OK to share on the internet.
3. Groups use the whole class time to work together coding the links and making the explanation pages for their group websites on the mele that they analyzed earlier.
   a. If you think it is helpful, you might ask students to take on certain roles. Perhaps some of the students want to focus on the HTML code while others focus on the color scheme and finding pictures, while others focus on writing the explanations that will be put on the web pages.
4. Assign students homework to finish their websites in time to hō‘ike.

(OPTIONAL)
- Introduce CSS, showing how shared elements between CSS and HTML work, and how CSS can be used to make the website more visually appealing.
- Work with a music teacher or kumu hula to have students learn to perform their mele.
CLASS FIVE - HŌ‘IKE

PREPARATION:
• Invite family members or other folks from outside of class to be an audience
• Set up projector and have everyone’s audio and websites ready to go
• You’ll have to either copy everyone’s HTML files to each computer, or post them to the internet through a free web hosting service. (See more on this in the Appendix.)

IN CLASS:
1. Welcome guests and get everyone settled.
2. Teams play their mele (or read their poem aloud) one by one for the audience to listen to. Then the group presents their website in five minutes, clicking through and showing the audience how their website explains the meaning of the mele.
3. At the same time, audience members are at their computers, able to click through and peruse the finished websites that go with each mele.
4. After each team has presented an have the audience do a secret vote to select their favorite website.
5. Teacher leads class discussion to re-emphasize enduring understandings and ask students about what other insights they had throughout the project.
6. Assign students homework to do a written reflection / self-evaluation of the project.

REFERENCES
On Kaona and “Kaulana Nā Pua”
Definition of Kaona
http://www.huapala.org/
Kaulana Nā Pua video
http://www.huapala.org/Kau/Kaulana_Na_Pua.html

On Digital vs. Analog, and Waves
https://learn.sparkfun.com/tutorials/analog-vs-digital
Mechanical vs. Electromagnetic Waves video
Digital and Analog technology video
http://www.wired.co.uk/news/archive/2013-07/18/analog-future

On HTML and CSS
http://websitesetup.org/html5-cheat-sheet/
https://www.w3.org/Style/Examples/011/firstcss.en.html
http://www.w3schools.com/html/html_basic.asp
Codecademy HTML and CSS
Recommended text editor: http://brackets.io/

Other
http://textmechanic.com/text-tools/obfuscation-tools/
binary-code-translator/
http://genius.com/
How to put your website online
How to put your website online for free
<table>
<thead>
<tr>
<th>Website Rubric Criteria:</th>
<th>Score and Comments</th>
</tr>
</thead>
</table>
| Informative: Do the links lead us to informative websites or written explanations of a literary device? Does the website overall give us a comprehensive understanding of the kaona of the mele? | 0 - There are no links or the links do not work.  
1 - Links lead to very poor explanations and there are no further links that lead to sources where students got the information. There may be mistakes in content or in the writing.  
2 - Links lead to good explanations but there are no further links that lead to sources where students got the information. There may be mistakes in content or in the writing.  
3 - Links lead to informative explanations with further links that lead to sources where students got the information. There may be mistakes in content or in the writing.  
4 - Links lead to informative and well-written explanations with further links that lead to sources where students got the information. However, readers understand only parts of the mele but still have questions about the mele as a whole.  
5 - Links lead to informative and well-written explanations with further links that lead to sources where students got the information. Taken together all the links contribute to a full understanding of the mele. |
| Increased Enjoyment: After viewing the website, does your enjoyment of the mele increase not at all, a little, a lot, or REALLY a lot | 0 - Not at all  
1 - A little  
2 - A lot  
3 - REALLY a lot |
| Visually Appealing: Is the website visually appealing, with spacing that is readable, no spelling or coding errors, and colors and pictures that enhance the mele? | 0 - Very little effort at making the website visually appealing  
1 - Some effort has been made to make the website visually appealing  
2 - Website is very visually appealing |
| Total Possible Points | / 10 |

<table>
<thead>
<tr>
<th>Written Explanation Rubric Criteria:</th>
<th>Score and Comments</th>
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</table>
| Does the student accurately discuss the pros of transmitting a mele in person? | 0 - Student does not discuss any pros  
1 - Student discusses some pros  
2 - Student thoroughly discusses pros |
| Does the student accurately discuss the cons of transmitting a mele in person? | 0 - Student does not discuss any cons  
1 - Student discusses some cons  
2 - Student thoroughly discusses cons |
| Does the student accurately discuss the pros of transmitting a mele using a computer? | 0 - Student does not discuss any pros  
1 - Student discusses some pros  
2 - Student thoroughly discusses pros |
| Does the student accurately discuss the cons of transmitting a mele in person? | 0 - Student does not discuss any cons  
1 - Student discusses some cons  
2 - Student thoroughly discusses cons |
| Does the student accurately use the following terminology, or are the terms sometimes confused?  
- sound waves  
- electromagnetic waves  
- analog  
- digital  
- kaona | 0 - Does not use the terms  
1 - Uses some of the terms, or uses some of them incorrectly  
2 - Uses all five terms correctly |
| Total Possible Points | / 10 |
APPENDIX: BUILDING A WEBSITE

Although we are used to appearing as experts to our students, to teach coding we have to leave behind our comfort zones and take the risk of appearing imperfect. This is OK--real coders do not have every bit of code memorized, and they do not know every coding language out there. Coding is actually about learning how to problem solve; although some coders have vast knowledge, every coder relies on an online community that collectively holds knowledge.

As you learn to make this basic website, you will be modeling for your students what it looks like to be a self-directed learner who keeps trying in the face of adversity. If a student asks you a question that you don’t automatically know the answer to, say, “You know, I’m not sure. Let’s see if we can figure it out together” and then model research skills like going to reference material or intelligently googling to find an answer.

1. To get a basic overview of the HTML code you’ll be using, I highly recommend you take yourself through the free course at Codecademy on HTML and CSS. However, there are many more resources online that can give you a basic overview.

2. I recommend using Brackets as your text editor. http://brackets.io/ You can download it for free, and it is very user-friendly. It allows you to view your web page at any time by selecting File > Live Preview.

3. One valid approach might be to make an HTML cheat sheet for your students and turn them loose to experiment with using some basic tags. If you take this approach students will have to figure out for themselves how to make the code work, and troubleshoot their own problems by making changes to the code and then previewing their page in order to observe what works and what changes in the code cause what changes on the webpage. Students will not learn the standard structure and format of a page of HTML, but they will gain experiential knowledge of how the code works, and they will feel like detectives.

4. Another approach is to lead the students through a very guided process. This way students will form good habits in terms of following the standard format. The downside is that students will progress at different rates, so the ones who want to speed ahead may get bored, while the ones who need more time may be left behind.

5. I highly recommend making your own website first to try out the skills you learned in the Codecademy tutorial. When you first download, install, and open Brackets you will see an “Getting Started” HTML page with instructions on how to get started using Brackets. I recommend reviewing this thoroughly. Below is a screenshot of the part of the “Getting Started” document that tells you how to set up your own project.
6. To set up your own project folder and HTML document in Brackets, first make a file for the project anywhere on your computer, and name it whatever you want. Then, follow the instructions to open that file in Brackets.

7. Once you’ve made the project folder, you need to make the homepage of your website. This is usually named “index.html”. Select File > New and a new document will appear in the sidebar. It will be untitled. Select File > Save As and name the document “index.html”. This will be the same procedure you follow to make the HTML documents for every subsequent page in your website (as well as a CSS stylesheet, if you choose to make one).

8. The image on the right depicts that the Untitled document has been renamed “index.html” and has been added to the project folder.

9. From here you are free to start using the HTML (and CSS) you learned through the Codecademy tutorial. Remember you can select File > Live Preview to check your code and see how it renders as an actual web page. Here’s a quick peek below at my actual example so you can get an idea of how your project in Brackets might look eventually—with many pages and with a CSS stylesheet (“style.css”).

10. To actually put the finished websites that you or the students make on the internet, you will need to get a domain name and web host. This video is a good tutorial on how to do that: https://www.youtube.com/watch?v=tq7dqHCC7U and there are other tutorials online. (Tip: At the very end of the video he also goes over how to make changes to your website once it has already been posted online—that is something you or your students will likely want to know how to do.) Note that it does cost money to purchase a domain name and host, but there are cheap options out there. It’s also possible to research free hosting services such as the one used in this video tutorial on putting your website on the internet for free: https://www.youtube.com/watch?v=BpmYbFzhJPA.