The Role of Web Broadcasts to Develop Online Learning Communities in STEM: a multiple case study

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The role of web broadcasts to develop online learning communities

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Overview

• Introduction: Interactive web broadcasts
• Research focus: Sense of community and learning
• Methodology: Multiple case study (two of five modules)
• Preliminary findings: Analysis of interaction, survey and interview data
• Conclusion and next steps
Interactive web broadcasts

- Live web broadcasts known as (labcasts and fieldcasts).
- Integrate HD video streaming and audio, real-time chat messaging.
- Audience voting widgets allow interactive feedback.
- Production team, presenters and chat-room moderator.
Research focus

• How does web broadcasts influence students’ sense of community and support their learning?

• The OU STEM Schools
  – Life, Health and Chemical Sciences
  – Computing and Communications
  – Physical Sciences
  – Environment, Earth and Ecosystem Sciences
Multiple case study

- Remote Experiments in Physics and Space
  - Observe interactivity to measure engagement
    - Interaction data (widgets, system data logs and chat transcripts)
  - Measure students’ perceptions of their attitudes and sense of community
    - Online questionnaire
    - Classroom community scale (Rovai, 2002)
    - Feedback widgets
  - Explore students’ opinions and perspectives
    - Semi-structured interviews

- Environmental Sciences
  - Observe interactivity to measure engagement
    - Interaction data (widgets, system data logs and chat transcripts)
  - Measure students’ perceptions of their attitudes and sense of community
    - Online questionnaire
    - Classroom community scale
    - Feedback widgets
  - Explore students’ opinions and perspectives
    - Semi-structured interviews
## Engagement during event

<table>
<thead>
<tr>
<th>Title</th>
<th>Interactive Users</th>
<th>Chat users</th>
<th>Chat Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>An interactive introduction to remote experiments in physics and space</td>
<td>59/59</td>
<td>45</td>
<td>92</td>
</tr>
<tr>
<td>The physics project</td>
<td>49/50</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>The planetary science project</td>
<td>34/37</td>
<td>20</td>
<td>125</td>
</tr>
<tr>
<td>Exploring Mars: interview with NASA expert</td>
<td>59/66</td>
<td>43</td>
<td>184</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title</th>
<th>Interactive Users</th>
<th>Chat users</th>
<th>Chat Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldcast 1: Making Observations &amp; Developing Hypotheses</td>
<td>120/130</td>
<td>79</td>
<td>246</td>
</tr>
<tr>
<td>Fieldcast 2: Developing Methods &amp; Data Collection</td>
<td>110/113</td>
<td>69</td>
<td>199</td>
</tr>
<tr>
<td>Fieldcast 3: Analysing Data &amp; Making Conclusions</td>
<td>99/111</td>
<td>69</td>
<td>230</td>
</tr>
</tbody>
</table>
Live feedback during a labcast

Word Cloud Wordle

- What 3 things would you take away from this astronomy labcast?

- Affective factors
  - confidence, clarity, kindred spirits

- Cognitive factors
  - experimental, planning, hypothesis testing
How did labcasts support your learning?

<table>
<thead>
<tr>
<th>20.1. The labcast aided my understanding of what I needed to do in the experiment itself</th>
<th>20.2. The project forums aided my understanding of what I needed to do in the experiment itself</th>
<th>20.3. The Video 5.1 Introducing the Gas Cell clip on the module website did not aid my understanding of the infrared spectroscopy experiment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neither disagree nor agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>19.2. The fieldcasts helped me understand the terms, classifications systems and units of measurements</th>
<th>19.3. The fieldcasts helped me understand the underlying concepts and principles associated with environmental science</th>
<th>19.4. The fieldcasts helped me understand the appropriate methods of acquiring, interpreting and analysing scientific data and information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neither disagree nor agree</td>
</tr>
</tbody>
</table>

Physics and Space: 15/83 = 18%

Environmental Science: 29/305 = 10%
How useful did you find the labcasts?

Physics and Space: 15/83 = 18%

4.1. Meeting your lecturers at the start of the module
4.2. Listening to explanations and discussions between presenters
4.3. Feeling like you are 'really there' in the laboratory
4.4. Reducing isolation
4.5. Making the study material more personable
4.6. Discovering how scientific concepts are practised in real-world situations

Environmental Science: 29/305 = 10%

4.1. Meeting your lecturers during module
4.2. Listening to explanations and discussions between the presenters
4.3. Feeling like you are 'really there' in the field
4.4. Reducing isolation
4.5. Making the study material more personable
4.6. Discovering how environmental science is practised in real-world situations
Classroom community scale

20-item scale to measure perceived level of community within a course (Rovai, 2002)

Example of questions:

- I feel isolated in this module
- I do not feel a spirit of community
- I feel that I am encouraged to ask questions
- I feel uneasy exposing gaps in my understanding

<table>
<thead>
<tr>
<th>Module</th>
<th>Connectedness /40</th>
<th>Learning community /40</th>
<th>Overall community /80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote experiments in physics and space</td>
<td>28.3 (S.D. = 6.0)</td>
<td>32.9 (S.D. =6.1)</td>
<td>61.2 (S.D. = 11.5)</td>
</tr>
<tr>
<td>Environmental sciences</td>
<td>22.9 (S.D. = 6.1)</td>
<td>29.8 (S.D. =5.5)</td>
<td>52.7 (S.D. =10.9)</td>
</tr>
</tbody>
</table>

Qualitative survey comments

<table>
<thead>
<tr>
<th>Themes</th>
<th>Student data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>“I liked that the students could vote and add to the fieldcast investigation”. (RNL-E-S15)</td>
</tr>
<tr>
<td></td>
<td>“I'm not convinced that audience participation is a good thing. Letting the scientists that you have choose a topic for investigation might be better”. (RNL-E-S26)</td>
</tr>
<tr>
<td></td>
<td>“I liked the scientists showing the experiments and explaining the features and how they operate. They made it interesting and engaging and seemed to work well together”. (LAR-P-S06)</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>“Made it seem like I was taking part”. (LAR-E-S17)</td>
</tr>
<tr>
<td></td>
<td>“I particularly liked the human angle in the interview for the Mars project labcast. Since being human is the only thing we all have in common for sure, I think it is important to see the human aspects of those that make science, not only the technical stuff”. (RNL-P-S14)</td>
</tr>
<tr>
<td>Learning</td>
<td>“The recordings were a great help, enabling me to go back and look at the investigation again when writing my report”. (RNL-E-S21)</td>
</tr>
<tr>
<td></td>
<td>“I consider them extremely valuable at introducing the relevant project” (LNR-P-S07)</td>
</tr>
<tr>
<td>Interview comments</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td><strong>What motivated you to attend the live event?</strong></td>
<td></td>
</tr>
<tr>
<td>we heard before that you get to <strong>steer where it was going</strong> so I really wanted to do that because like in the other assignments you’re just given a scenario or whatever and you just have to work on it but with that you can be ‘yeah I want that I think we should do this’ and then we all vote (E-S03)</td>
<td></td>
</tr>
<tr>
<td>I think it was the <strong>opportunity to listen to the practicing scientists</strong>. It’s good to listen to them and you get insights from hearing people speak and contributing in the chat and so on that you just don't get from reading a textbook (P-S01)</td>
<td></td>
</tr>
<tr>
<td>I think I could see from the module material that I have to <strong>get my head around the theory</strong> behind the design of a complex experiment and then do it and write it up. I thought labcasts would <strong>introduce it in an easy to grasp way and would make that process easier</strong>. (P-02)</td>
<td></td>
</tr>
<tr>
<td><strong>I had the time.</strong> It wouldn’t be as good as being there… getting down and dirty in the mud. That would be better, <strong>but this was the next best thing</strong> and at least because it was February, we didn’t get cold. (E-S02)</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions and future work

• Preliminary findings
  – Positive attitudes on sense of presence, engagement and learning
  – Study shows labcasts and fieldcasts can help foster a sense of community and perceived learning outcomes
  – Perceptions of community in labcasts may be influenced by sense of community in a module
  – Motivation to attend possibly indicates ownership of learning

• Next steps
  – Compare findings across five modules
  – Validate data with module teams
  – Feedback recommendations of good practice to staff
  – Develop a set of guidelines on the pedagogic and social features that support fieldcasts and labcasts