

Online Interactive Tools for Ocean and Climate Science Education

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Introduction

The Centers for Ocean Sciences Education Excellence (COSEE) is a national network with the collective mission to engage scientists and educators and transform ocean sciences education. The network is comprised of twelve centers that are either regional or thematic in focus. As a thematic center, COSEE-Ocean Systems has worked to create and develop a suite of interactive tools that can be used to enhance ocean and climate literacy by emphasizing the connections between the ocean and the Earth's climate system.

A Pair of Connected Tools

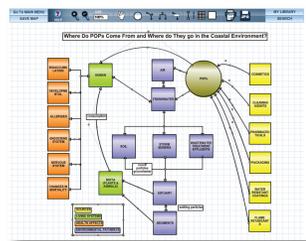
In two linked applications – The Ocean Climate Interactive (OCI) and Concept Map Builder (CMB) - concept mapping is used as a foundation for learners to make connections between fundamental concepts in ocean and climate science. These cost-free online tools have been incrementally developed, tested, and refined through a series of teacher/scientist professional development workshops to maximize their efficacy.



Ocean Climate Interactive

All visitors can:

- Explore links in ocean and climate concepts
- Watch videos, download resources
- Reinforce their understanding of connections between climate and ocean systems



Concept Map Builder

Registered users can:

- Build custom concept maps
- Add multimedia assets from a large database of resources to enhance their message
- Create their own enhanced maps for curriculum planning, study aids, collaborative projects.

Beyond Traditional Mapping Software

What makes the CMB different than traditional concept map building software? Its integration with the OCI and the multimedia assets available in the COSEE-OS database. Users can augment their concepts with additional materials available through hyperlinking when displayed through the OCI interface. With this functionality learners can create concept maps and explore ocean climate connections. In addition, educators can create lesson plans, presentations or multimedia collections to supplement their curriculum.



Multimedia Assets



Enhanced Presentations

Both free tools can be accessed at:
<http://cosee.umaine.edu/tools>

Using Concept Maps for More than Assessment

Traditionally, concept mapping has been used in education as an assessment tool, but COSEE-OS has found that it can act as a catalyst to promote dialogue, understanding and consensus around scientific concepts, and is well suited for application to complex and system-scale science (deCharon et. al, 2009).

Concept maps can also be applied as curriculum development tools, presentation aids and even for creating graduate thesis outlines. Many Educators who have participated in our workshops have gone on to use concept mapping in many other unanticipated and novel ways.



What educators have to say...

"I will be using these concept maps to initiate each new major unit, to help my students better organize their work for that particular unit. I feel that it will significantly raise the level of learning that goes on in my classes."

"I have confidence I will be able to add concept maps to my Chemistry courses and help my students understand more difficult concepts."

"I will absolutely use the concept mapping tool to create comprehensive maps ... of my grant programs and professional development offerings ... as well as to analyze the gaps in my programs."

What scientists have to say...

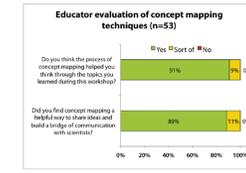
"I will use this both in my classroom, but also in the conceptual development of ecological models in my research."

"I'll definitely do more concept mapping to organize course content. I'll also use it to help with unfamiliar (to me) audiences. I also plan to experiment with it for setting boundaries on grad research problems..."

A. deCharon, J. Albright, C. Herren, A. Cline, and J. Repa, 2009, "Online Tools Help Get Scientists and Educators on the Same Page," Eos, Transactions, American Geophysical Union, v. 90(34), 289-290.

Evaluation from Educators

Concept Mapping



Formal and informal educator participants in COSEE-OS workshops have found concept mapping to be a useful tool for organizing complex ideas in STEM courses and ocean/climate science programs.

91% of educators thought concept mapping helped them "think through the topics learned" during the workshop, and 89% agreed that not only did it help them to organize the content, but also to "share ideas" and "build a bridge of communication" with scientists.

These results demonstrate a potential for collaborative concept mapping to become a successful component of scientist/educator partnerships.

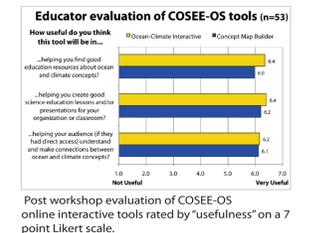


Educators and scientists collaborate on a concept map at a recent COSEE-OS Workshop at the University of Connecticut.

Useful tools for teachers

Each online tool was rated highly by educators when asked about the usefulness to their work. Both the Ocean Climate Interactive and Concept Map Builders were rated 6.0 or above on a 7 point Likert scale in post-workshop evaluations in usefulness for:

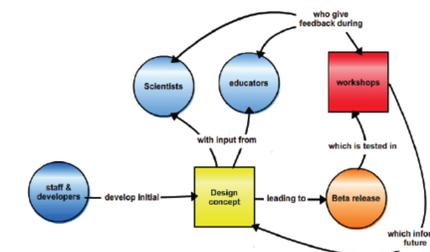
1. Finding good education resources about ocean and climate concepts
2. Helping them to create good science education lessons and/or presentations
3. Helping their audience(s) understand and make connections between ocean and climate concepts.



Post workshop evaluation of COSEE-OS online interactive tools rated by "usefulness" on a 7 point Likert scale.

Development Process

The COSEE-OS team uses an iterative development process to ensure that users of the interactive tool influence future development plans.



Each application is tested and refined in response to user feedback from teacher/scientist professional development workshops. The suggestions received through evaluations and interviews are incorporated into later versions of the software, and will continue to be developed to meet the needs of the target audiences of educators and scientists.

For more information on tool development, upcoming webinars, or any general questions, please contact us:

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