

Vision Paper – COSEE Future (Centers for Ocean Science Education Excellence)

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Background: At the turn of the millennium, COSEE was conceived by forward-thinking agencies, educators, and scientists. In retrospect, COSEE has achieved considerable strides in creating a network and infrastructure through which ocean education excellence can be fostered. The COSEE mission is:

“to significantly enhance ocean learning opportunities for all age levels (including adult and non-formal education) by incorporating the work of ocean science researchers into high-quality educational products and services and providing opportunities for networking between oceanographic researchers and educators. The COSEE network will serve as a window to ideas, information and resources that connect and celebrate ocean sciences, teaching, learning and scientific discovery at all levels.”

The overarching goal is “to increase and enhance collaboration and communications among ocean scientists, educators, and the general public.”

Also in 2000, The Ocean Project (an ocean conservation organization I founded in 1996) had just completed the most comprehensive survey ever conducted to assess public knowledge, attitudes, and feelings about the ocean (www.theoceanproject.org). That survey, and our subsequent research on attitudes about the ocean and peoples' motivations to engage in learning about the environment, tell us that we still have far to go to create an ocean-literate public. This paper provides a sketch of three systemic hurdles that must be vaulted before creating an ocean-literate public will be possible – an education space where COSEE is poised for success.

Perhaps most important in this discussion is a recognition of how the ability to communicate about any subject has been massively amplified in both time and scale by the Internet. This phenomenon has reverberated through all forms of communication and media with the unfortunate result that the ability to *mis*-communicate has become equally magnified. This has dramatically steepened the slope of the path to succeed in building ocean literacy broadly. A current example of this surrounds climate change. As with many topics about ocean science, climate change is technically complex and very long-term. These factors have spawned many competing entities – from the most earnest and credible scientists to the most profit-driven deniers – who engage in dueling communication at an unprecedented global scale. A most unfortunate outcome of this quarreling about science is that the public now sees climate change not as a technical issue but as a political one. The result is that what once was only the challenge of developing communications to make a technically difficult concept understandable is now a much greater hurdle – re-framing the issue in a manner that the public trust can be re-gained before people will be in a *position* to become climate literate. Worse, it is not as simple as that because, in the meantime, the landscape has been forever changed by similar phenomena throughout all facets of society. What can be done?

There is a need to change perspective in order to see the scale of the problems properly if our aim for an ocean-literate public is to be fulfilled. For example a serious focus on the three meta-problems outlined below could go far toward achieving this goal. Each is sketched separately, but success will come from their tight integration.

The Wisdom of Standards: The COSEE mission “to significantly enhance ocean learning opportunities for all age levels ...” remains commendable. However, the oceans are effectively *absent* from the document used by 70% of teachers nationwide to guide, with high specificity, what science concepts they teach students in grades K through 12 – the National Science Education Standards (National Academy of Sciences, National Academy Press). Further, these standards have been echoed through many regional and state standards. Wisdom emerged in the National Academy’s devoting significant resources toward creating a set of national standards for science education. In fact, the approaches and concepts that are presented in the National Standards for Science Education are extremely well developed. However, it is unfortunate that substantive content about the oceans is virtually *absent* from these national standards for student learning about science. The result is that the commendable COSEE mission – “to significantly enhance ocean learning” – is undermined before the school bell rings, as 70 percent of student learning is guided by standards that avoid substantive ocean subjects. This situation affects learners of other ages as well, for whom programs are influenced by such a prominent guide. For an ocean-literate public to emerge, ocean sciences should be a significant and integral part of our national standards for science education. COSEE should focus on changing this inexplicable situation to create a landscape within which ocean literacy is likely to emerge. COSEE’s existing infrastructure offers the right resources to make this happen.

A Need for Potent, Cross-Platform Integration: The COSEE mission strives to foster ocean learning for all ages “(including adult and non-formal education) by incorporating the work of ocean science researchers into high-quality educational products and services and providing opportunities for networking between oceanographic researchers and educators.” Again, this is a positive statement and much has been accomplished. But there is something missing. We now know the science which people understand and retain aggregates largely from experiences outside the classroom. Formal education can no longer be thought of as only classroom-based – as reported in the journal *Nature*, “Much of what people know about science is learned informally. Education policy-makers should take note” (Editorial 8 April 2010). The National Academy itself recently reported that “Informal environments are of *fundamental importance* for supporting science learning... and improving students’ *attitudes toward science*.”

A more robust integration of formal, informal, and social education methods could bridge the COSEE mission to a new level of performance. We need more than traditional networking between scientists and educators. Balancing the science-learning equation will require a highly efficient and massively integrated network of ocean scientists, learning scientists, educators, informal education practitioners, social scientists, and an infrastructure that fosters cross-platform integration of ladder-ed educational messages about the ocean.

Creating an ocean-literate public should start from the ground up: K–12, secondary, higher learning, adult education, integrated across formal, free choice, and social platforms. Parts of this have been tested, but we need to treat society as a whole if we want the whole of our society to be ocean literate. This process can be advanced through re-integrating existing infrastructures – the COSEE network as well as non-profit networks like AZA, ASTC, and AAM, for example. These non-profit entities serve enormous numbers of people through *overlapping* audience participation, which, if properly integrated, will reinforce consistent messaging through *successive* experiences across multiple sites. A realistic outcome will require stronger partnerships and proper, shared support applied across three dimensions: content, audience, and venues.

The Need to Innovate *Non-Conventionally*: Discussion of how to build ocean literacy is circumscribed by an even larger problem – literacy itself. Many studies show that literacy is thwarted by (among many other things) bureaucracy. The future COSEE may be most productive if focused on integrating existing entities that offer opportunities for *non-conventional* innovation – something *other* than a new wave of “innovation” through conventional, public education paths.

We know that students across the US are falling behind in international science comparisons. Clearly, public schools do not advance learning in the sciences sufficiently. In addition, studies show a “summer slide” in which “low-income kids slip as many as three months of progress in reading comprehension [each summer], compared to middle income kids” (Harris Cooper). By the end of elementary school these students are two years behind. It is a major, nationwide problem – a problem at the very root of building literacy.

Presently, COSEE infrastructure typically links a higher learning institution with a local aquarium, which offers obvious opportunities for ocean education via the large audience of aquariums. Working with the existing COSEE organization (higher-ed / aquarium links), ocean literacy could be built by linking kids from urban schools to this infrastructure and focusing on summer as the season of opportunity – when many urban kids suffer “summer learning loss.” While middle and upper income kids attend camps and other enriching summer activities keeping their brains in gear, many urban kids have video and computer games, – or much less.

AZA aquariums are sited in urban centers, serving large disadvantaged youth audiences (ASTC & The Ocean Project offer an even wider audience). True innovation might occur if COSEE was the catalyst in bonding institutions of higher learning and learning research with aquariums and science centers. Such relationships have occasionally percolated but remain to become a replicable, mutually valued, engine of youth learning.

I envision a future COSEE creating the next generation of ocean education infrastructure – a massively integrated, network of university-aquarium-school centers-of-excellence in summer ocean education. A network that brings summer alive for urban youth scholars through programs modeled after, for example, the Indiana Mind Trust’s Summer Advantage, Corbin Kentucky’s Redhound Enrichment, and Cincinnati’s Fifth Quarter. Programs rich with water and sand and the smell of a marsh, the fun of fishing and measuring their sizes and weights in the sun, and the magic of fireflies, spiders, horseshoe crabs, and jellies, dolphins, octopus and frogs. AZA-accredited aquariums and zoos have forwarded “stealth learning” for decades – the time is at hand, the tools are available, highly qualified partners are ready, and the basic infrastructure is tested through COSEE’s first decade of valuable experience. The will is here, funding is needed, and hurdles must be scaled for the creation of ocean-aware learning standards, cross-platform integration, and *non-conventional* innovation to build ocean literacy through the next decade of ocean education excellence.