Transforming Education to Address Complex Futures

Elizabeth Endler (Shell)
Helga Huntley (Rowan U.)
Lea Jenkins (Clemson U.)
Susan Powers (Clarkson U.)

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The Problem

- Society’s Grand Challenges are problems that span disciplines and cannot be solved in silos.
- The workforce of tomorrow needs to be **nimble** and **collaborative**.
- Today’s education system is largely based on silos and emphasizes the ability to replicate over the ability to innovate.

**We need critical and strategic THINKERS who can envision the future and create solutions developed in collaboration within an interdisciplinary team.**
Vision: This is an example of what students can do

- Ecosystem Restoration
- Community Connections
- Climate science
- Math modeling
- Costs

Overall Impacts
- Workforce prepared to address complex problems and grand challenges
- Disruption of academic silos and traditional academic reward systems to improve inter/transdisciplinary education and/or research collaboration teams
- General increase in climate and sustainability literate public

Vulnerability Plan for Campus & Local Community
The Roadmap

The pilot....

- Fund several schools to develop and assess curricular change (NSF ADVANCE or ERC type grants)
- Gather input from industry and students to assess demand and need
- Curriculum / Course Adaptation
  - Incorporation of a grand challenge theme as a common thread in general education courses
  - Adapt content and pedagogy in existing disciplinary specific courses to be more responsive to today’s needs
  - Multidisciplinary capstone project, individual research, or internship that involves economics and/or social science alongside natural science/math/engineering
- Train faculty to develop THINKERS
  - Based on existing literature
  - Continue to adapt to disseminate new successful approaches

- University Restructuring
  - Commitment to change academic structures to encourage and reward cross-departmental collaboration and reduce department-scale bean counting
  - Re-write tenure expectations to value applied projects, community service

Assess - Does it Work???

- Work with Education researchers
- Evaluate changes with
  - Students
  - Faculty
  - Institution
  - Employer satisfaction

Replication...
Challenges and Possible Solutions

**Will there be buy-in from the universities?...from faculty?**

> Start with a proof of concept; respond to industry needs; provide funding

> Not all faculty need to participate

**Does this make sense (financially)?**

> Greater marketability for jobs

> More cohesive educational experience

> Opportunity to enhance grant competitiveness

**Does this dilute education?**

> No, transdisciplinary themes can be woven into existing rigorous content (e.g. using pertinent examples to illustrate mathematical concepts)

**How can equity concerns be addressed?**

> Entry barriers should be addressed in the pilot programs

**How does this contribute to research?**

> Better thinkers make better researchers in the lab

> The pilots will also be the basis for research in STEM education.

**How can we impact the wider community beyond college students?**

> “Trickle-down” education: We educate teachers, who educate K-12

> Concepts can be incorporated in continuing ed and community colleges

> Encourage collaboration between regional institutions
Why now and why NSF?

- Global problems are complex: extreme weather, clean energy and its role in energy security, the global pandemic, supply chain challenges,...
- Current education structure is not set up to solve these efficiently and effectively.

- NSF "...supports basic research and people to create knowledge that transforms the future." The National Science Foundation has a *unique position at the interface of scientific advancement and education, with expertise across disciplines and focused on far-reaching efforts that advance society*. NSF also has experience with funding award structures that are applicable to this topic, easing implementation.