

# How Global Learning Cultivates Critical Thinking: A Journey of Pedagogical Innovation

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# Critical Thinking

- Is *“in short, self-directed, self-disciplined, self-monitored, and self-corrective thinking, which requires rigorous standards of excellence and mindful command of their use”* (Paul & Elder, 1999, P.2)

# International Virtual Exchange



TECHNOLOGY  
ENABLED



SYNCHRONOUS OR  
NEAR SYNCHRONOUS

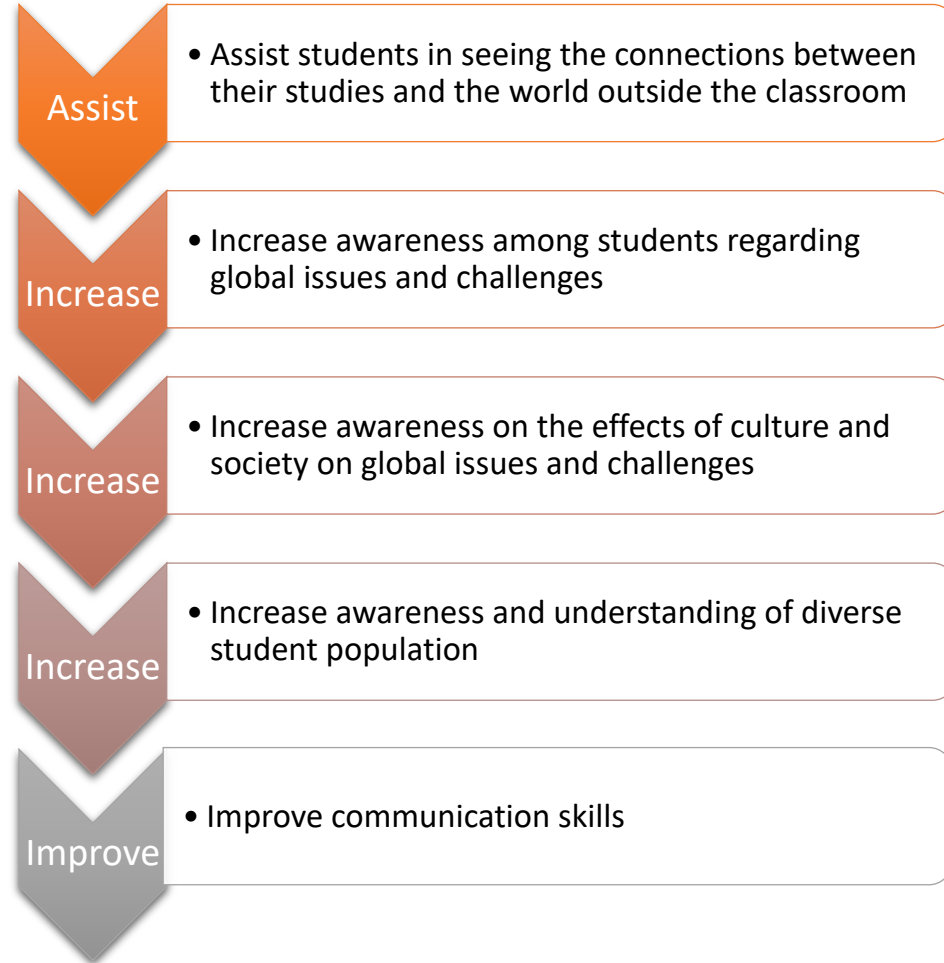


STRUCTURED  
INTERCULTURAL  
EXCHANGE



STUDENT TO STUDENT

# IVE as Window to the World



# IVE Sample Projects

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# Spring of 2021 and 2022

Clemson University

Course: Introduction to  
Environmental science and Policy –  
ENSP 2000

Population: Sophomores to Seniors

Field of Study: All majors

Tel Hai College

Course:

Population: Juniors

Field of Study: Biotechnology  
majors

# Methods

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Shared Zoom meeting with the two groups

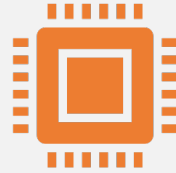
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*“Canvas Free for Teachers”* for discussion and cooperation

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Final presentations through *Zoom*

# Courses Description



CU - ENSP 2000 (CT2, STS)

Basic principles of environmental science, including ecology, energy, resources, waste management; and air, water, and soil pollution. Consideration of issues, specific cases, investigative approaches, and remedial actions.



Tel Hai College – Advanced Seminar

Advanced practice in scientific writing, an in-depth research study of a selected topic in the field of environmental science, writing a scientific manuscript, and giving a scientific presentation in a binding form.



# Project Topics Samples

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## TEL HAI - RESEARCH TOPIC

Microplastics in the marine environment and its impact on animals and the human food cycle

Phosphorus recycling from agricultural wastewater and the circular economy to reduce its pollution to water and soil

Large-scale biodiesel production from different oil types using immobilized lipase

The impact of invasive insects on the development of eucalyptus trees and ecosystems in Israel

A comparative economical and environmental overview of hydrogen production processes

## ENSP 2000 GROUP – FINAL PROJECT TOPIC

Microplastic in the ocean and its impact on animals and human food cycle.

Water pollution due to fertilizer runoff.

Biodiesel production from different oil types in the US.

Invasive forest insects in North America.

Hydrogen production in the USA.






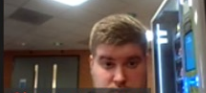

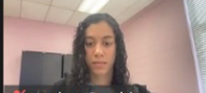
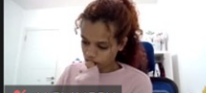
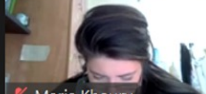
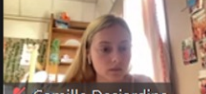
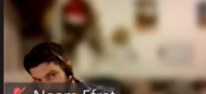
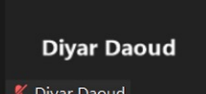
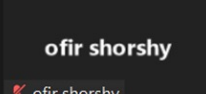
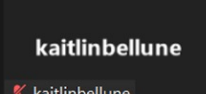

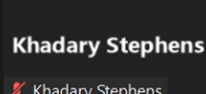
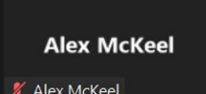
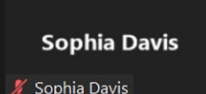
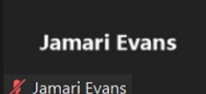

# Discussions and Presentations

## Micro-Algae?

**Microalgae are microscopic organisms found in both seawater and freshwater with more than 25,000 species already isolated and identified. These microorganisms perform photosynthesis, which is an important natural mechanism to reduce the atmospheric CO<sub>2</sub> concentration.**

**As an aquatic organism they have to deal multiple amounts of pathogens. Through out the evolution they have developed different mechanisms of dealing with different pathogens.**



 Minory Nammouz	 Eyal Kurzbaum	 Elad Cohen
 Tomer	 dor horovitz	 Nicholas Jarrett
 Charles Parker	 Amber Cassidy	 ALEMNESH
 Maria Khoury	 Camille Desjardins	 Noam Efrat
<b>Diyar Daoud</b>  Diyar Daoud	<b>ofir shorshy</b>  ofir shorshy	<b>kaitlinbellune</b>  kaitlinbellune
<b>Jillian McManus</b>  Jillian McManus	<b>Khadary Stephens</b>  Khadary Stephens	<b>Alex McKeel</b>  Alex McKeel
<b>Sophia Davis</b>  Sophia Davis	<b>Jamari Evans</b>  Jamari Evans	 Dylan Molinaro

# Discussions

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In this discussion post, we will start discussing your project's topic.

Tel Hai students: please post your project topic with a brief explanation of the topic and why you chose it. Does it relate to your current major or future career?

Clemson students: please reply to at least two of your international peers' posts. In your reply, please tell us if you think that the topic presented by your international peer is considered a global challenge and why and give specific constructive comments on your peers' posts.

# Discussions

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## Tel-Hai Student

*"I chose to study green energy, or more accurate, alternative energy. We all know that our resources in the world are limited and more over the way that we use them today are polluting the planet. I'm really interested in finding a green, cheap way to make our "leftovers" from the industry into energy. I think I will focus in this semester on using the gas that is emitted from factories and making the greenhouse effect and reuse it to create energy"*

## Clemson Students Replies:

- "I think this topic is definitely considered a global challenge. I think this is an awesome topic and can not wait to hear more about it!"*
- "I definitely think your topic is considered a global challenge. It is so important that we reduce all leftover waste on our planet, and it would be so beneficial to reuse it towards creating natural energy sources. I can't wait to find out how you plan to use the gas emitted from factories towards this 'green' mission."*
- "I find green energy very interesting, and I believe it is an extremely important global topic. I am an Architecture major, and I have been focusing on green and sustainable design, especially when it comes to green energy and conserving/reusing it. Though it comes mainly from factories it is quite interesting to see how much comes from other commercial buildings and how it all adds up. If we can find a green alternative, and implement it among all commercial buildings and factories, possibly even residential buildings, it will make a great difference."*

# Students' Reflections

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- **How did this international collaboration affected your understanding of global challenges related to our environment?**
  - *"It was interesting to hear these topics explained from someone with a new perspective..."*
  - *"It made me realize that even though our environments may be very different and in very different places, we still face very similar issues."*
  - *"...People all over the world are aware of and trying to find solutions that we hear about all the time in America."*
  - *"It was really and eye opener..."*
  - *"It made me feel that I was a part of a solution to bigger issues than just our own."*
  - *"...to hear about these issue first hand from international students really emphasized the meaning of global challenges."*
  - *"Overall this project was a fun experience and pretty eye opening..."*
  - *"It was very interesting to see students from other county and the way they go about learning materials like the way we do..."*
  - *"....it provided a large awareness of how global challenges are not only similar across countries but also are connected throughout the world."*

# Students' Reflections

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Please let us know how did this experience help you in communicating your project topic and how the interaction within this project helped you realize that your topic is a global challenge. Would you be interested in such cooperation in the future? Will you recommend this experience to a friend? Why or Why not?

- *“I very much enjoyed the experience I had during this IVE project. **This experience helped me in communicating my project topic because by listening to my international partner speak about our topic, it taught me more about the topic and gave me a reason to do research.** The interaction I had within this project helped me realize that my topic was a global challenge because it provided me with a lot of information and allowed me to really research more about how the use of algae is a global challenge and what all we can do about it. I would definitely be interested in doing this again in the future and would recommend this experience to a friend. **This whole project was very eye opening and made me more aware of global challenges that are happening in this world today.**”*
- *“I really enjoyed getting to know the Tel-Hai students and learning more about their research projects. Talking to our group's partner really helped me understand our research topic. I could ask questions and get a good introduction to the topic before doing more research on my own. **It was such an interesting experience to learn about how these challenges are being approached globally. I would defiantly recommend this experience to a friend because it was such a good learning opportunity.** Thank you for a great semester!”*
- *“**This project was a great opportunity to connect with students our age on the other side of the world, and also provided a great opportunity for learning as well.** It was super helpful to hear from my Tel-Hai partner, regarding his perspective that has developed as a result of his background and experiences in life. **That goes to show how a lot of the issues discussed in the course of this class stretch far around the world, posing a global issue and challenge that call for change.** I would very much so be interested in participating in a project like this in the future down the line. I loved working with different students from another school and found it to be interesting, fun, and informative. Overall, just a great experience! I would definitely recommend this project and experience to a friend as **a great, fun, and unique way to learn.**”*

# Students' Reflections

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- *“This experience was really different from anything I have experienced in a class or through Clemson before. I enjoyed getting to discuss such important topics with international students, and hear their perspectives and knowledge on these issues. **I definitely learned a lot through our international partners**, along with the research done independently on our topic. I would recommend this cooperation to a friend as well as I would be interested in this experience again because it helped me get engaged with the topic and our groups.”*
- *“It was very nice to meet you all. Meeting people from an entirely different part of the world should be something easy to do in modern-day, but it's still such a rare occurrence. **I figured the whole world would have similar issues, and while it is somewhat the case, talking with you guys made me see that some places are affected harder by some of these global challenges**. For example, Dor told me a story of how he went to California and had a much harder time breathing, simply because the air quality was so poor. I would be interested in such cooperation in the future, as this has been a good experience. **I do wish however that we were only more involved in each other's work like we actually made our presentations together**. Overall though, I would recommend this experience is a friend. It's quite nice.”*
- *“I really enjoyed this experience! Working together with our international partners really broadened my perspective on how global issues affect people all around the world. It was a pleasure to work with my group's Tel Hai partner Noam, and his topic (Remote Sensing) was really innovative, interesting, and a great way to tackle global issues on agriculture and water resources. **I didn't even know remote sensing was a thing until this project, and now I am very interested in learning more about it!** I would absolutely be interested in doing something like this again in the future, and I would recommend this experience to a friend because **it's a great opportunity to learn more about both international cultures and about global environmental issues**.”*



**Spring 2023  
Comparing More Than  
Two Countries**



A satellite view of Earth from space, showing the Americas, Europe, and Africa. The text "USA - Israel - Japan" is overlaid in the center of the image.

USA - Israel - Japan

# Spring 2023

- Clemson University : ENSP 2010 – Exploring Environmental Science
- Tel Hai College: Advanced Seminar in Biotechnology
- University of Fukui: Students volunteered from the School of Engineering, School of Global and Community Studies, and Graduate School of Engineering



# Project Overview

Two Zoom meeting with each country

- First Meeting:
  - Get to know our partners
  - CU students present
- Second Meeting
  - CU students interview their partners in breakout rooms.

CU students present their findings

# Students Work Samples

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# Cultural Background Effects (Waste Disposal)

## US

- Large Christianity population, leading to charities/resale stores
- "Hand-me-downs" are very common in families
- Otherwise, there is a large lack of environmental awareness in American culture.

## Japan

- Shintoism is a key idea, believing they need to appreciate/respect nature due to everything having a god.
  - Do not believe in letting things go to waste, leading to more people reusing certain things that Americans would usually just throw away.
  - "3 Gods in a piece of rice"
-

## Olivia's Individual Slides



Are there any solutions that can be thought of/implemented to help these oil spills (if any)?

- Junxuan believed that the first step to help oil spills in the ocean is to prevent them in the first place. There needs to be strict laws enforced to limit the amount of oil spills in oceans. Although he believes there are not much citizens can do to limit oil spills, industries need to consider how to limit their contribution to oil spills in oceans.
  - I researched the amount of oil spills in the oceans and found that 57% of oil spills come from industry-related activity. If government were to implement laws to limit activities related to the contribution of oil spills, more than half of the amount of oil spills would decrease.
- I agree with Junxuan that oil spills need to be prevented to limit the amount of oil spills in oceans. Although oil spills mainly come from industries, individuals need to consider their activities on shores as several oil spills in oceans come from sources on



# Adding the Field Trips Component

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Spring 2023/24

# Filed Trips to Local Facilities -Objectives



Identify local environmental  
issues



Apply knowledge learned in  
class to understand local  
environmental challenges



Compare and contrast local  
environmental challenges to  
global ones



Formulate suggestions or actions  
to mitigate those challenges





## Field Trips – Campus Facilities

- CU Experimental Forest
- Kite Hill Recycling Station
- The Poultry Farm
- Fike Recreation



# Students' Reflections on the Field Trips

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## Hands-on experience

*"The field trips allow us to have a hands-on view that made it easier to see what we were learning about"*

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*"I found it extremely useful to see these environmental issues firsthand."*

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*"field trips were able to give a visual understanding of certain environmental issues."*

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*"field trips helped us understand the process behind what we were learning."*

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## Accountability

*"Specifically, the recycling center really put into perspective the waste issue that we are dealing with, not only in our city but globally as well."*

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*"I believe that being able to experience the field trips helped us to better understand how the environment is affected."*

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*"I am now much more aware when I throw away my trash to make sure to put it into recycling bins."*

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*"The field trip to the recycling center has helped me recycle more."*

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*"These field trips helped me become much more aware of how my behaviors affect others and how I can change these behaviors in order to help the environment."*

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*"I learned how my actions impact our world."*

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*"I learned about ways to recycle as a student, ways the forest needs to grow, how composting works and how that helps the environment."*

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# Emerging Themes from Students Reflections on IVE

## It is not our problem only...

- *"This interaction helped me see the differences in the way that my topic affects other countries but showed me that it does indeed affect others on a global scale."*

## Human cooperation is the solution...

- *"The world is a big place and problems are everywhere around the world. We all must come together and be more educated about current problems"*
- *"Talking to the students made me realize how big this issue was and that steps need to be taken to solve this issues around the world, not just here."*

## Despite the language barrier...

- *"While it was difficult at times to understand our international partners, when talking about the waste production and management they brought up similar ways that their trash was handled and disposed as well as ways that are different than how we dispose of waste here in the US."*

## Beyond a traditional research project...

- *"I think it is easy to look up information about other country's issues online and to understand it, but to hear it coming directly from people that live there and understand it on a personal level makes it more interesting"*

## Increased motivation...

- *"It was very exciting to see people on the other side of the world that experience the same global effects that we do."*
- *"I really enjoyed talking to the international students as they were all very interested in our topic and had first hand experiences with the coral reef bleaching in Israel which made me even more aware of how it's affecting people around the world."*

# Questions?

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