Preliminary Analysis of Career Preparation through PFL/SAE-based Agricultural Instruction

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Source: Clipart Library

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Getting Started

- **Introductions**
  - MSU Dual-Doctoral Candidate, former Ag Instructor

- **Overview of Presentation**
  1. Maximizing Career Prep & Informed Decision Making in Ag Ed
  2. Overview of PFL/SAE-based Ag Ed
  3. 2018 Pilot Study Overview & Methods
  4. Preliminary Findings
  5. Discussion & Implications for instruction in agriculture.

Source: fotolia.com

Goals of Agricultural Instruction

- **Agricultural education exists to…**
  1. Prepare students for successful careers.
  2. Prepare students for a *lifetime* of informed choices regarding food, fiber and natural resources systems.
     - *Source: https://www.ffa.org/agricultural-education/*
- **This suggests that instruction that predominantly emphasizes static career skills is insufficient for full preparation.**
  - If you are 100% prepared for a career that will cease to exist in a decade, are you 100% career ready at graduation?
  - What about the lifetime of choices?

Source: wuhsag.weebly.com

Source: https://www.ffa.org/agricultural-education/

Two Competing Visions of Agricultural Education

- **Type I Ag Ed (Traditional)**
  - Classrooms primarily emphasize rote skills development.
  - Career experiences are open-ended and less prescriptive (*e.g. FFA Proficiency in an area unrelated to eventual career*).
  - Students receiving instruction for specific skills but have limited career adaptability and ingenuity.

Source: firesafetycork.ie

- **Type II Ag Ed (Progressive)**
  - Classrooms emphasize analysis, decision making, and critical thinking.
  - Career experiences are prescriptive and specific to intended career goals.
  - Students gain some specific skills as well as a high capacity to learn new skills in a rapid manner.

Source: carwad.net

Very-short Summaries of the Theoretical Perspectives

1. **Learning In School and Out (Resnick, 1987).**
   - Narrowly-defined career preparation is only effective in unchanging careers.

2. **Rethinking Transfer: A Simple Proposal with Multiple Implications (Bransford & Schwartz, 1999).**
   - Classroom learning generally fails to **transfer** to careers.
   - Classrooms should emphasize "preparation for future learning" (PFL).

3. **Situated Learning: Legitimate Peripheral Participation (Lave & Wenger, 1991).**
   - Effective career preparation depends on interactions with experienced professionals in authentic settings.

Source: Clipart Station

Broader Implications

- **These theoretical foundations provide insights for education overall.**
- **They suggest that all education…**
  - Should be grounded in **authentic real-world experiences** outside of classroom environments.
  - Should provide opportunities for students to be **immersed among communities of expert practitioners**.
  - Should emphasize **training for proficiency in systematic thinking** in classroom situations in lieu of rote styles of learning.

Source: 123RF.com

Challenges & Key Questions

- **How can we shift career/skills training to environments outside of classrooms within our current secondary and post-secondary systems?**
- **How can we adjust how we think about classroom instruction to fit these recommendations?**
- **Can these changes result in measurable outcomes to career performances?**
  - i.e. *transfer* from class to career

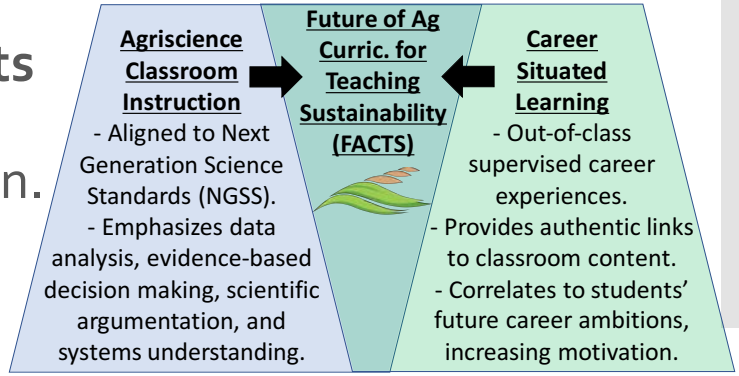
Source: Can Stock Photo

Future of Agriculture Curriculum for Teaching Sustainability

Overview of FACTS

- **Future of Agriculture Curriculum for Teaching Sustainability (FACTS)**
  - NSF Funded curriculum & instruction research.
  - Comprised of 3 one-semester HS courses.
  - Assesses effectiveness of PFL/SAE instruction on improving the adoption of more sustainable knowledge & practice among future agriculturalists.

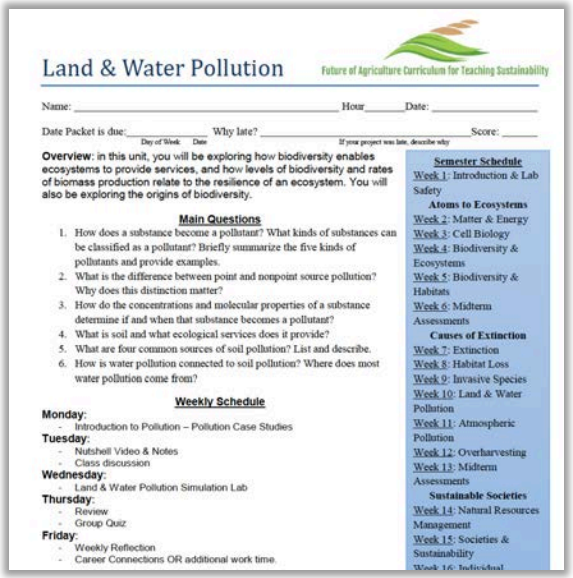
- **FACTS Key Components**
  - NGSS-aligned classroom instruction.
  - Supervised Career Experience Project



Future of Agriculture Curriculum for Teaching Sustainability

FACTS Key Components

- **PFL Instruction**
  - Aligned to AFNR & NGSS standards.
  - Science Literacy & Decision Making



Land & Water Pollution

Future of Agriculture Curriculum for Teaching Sustainability

Name: _____ Hour_____Date: _____

Date Packet is due:_____ Why late? _____ Score: _____
Day of Week Date If your project was late, describe why

Overview: in this unit, you will be exploring how biodiversity enables ecosystems to provide services, and how levels of biodiversity and rates of biomass production relate to the resilience of an ecosystem. You will also be exploring the origins of biodiversity.

Main Questions

1. How does a substance become a pollutant? What kinds of substances can be classified as a pollutant? Briefly summarize the five kinds of pollutants and provide examples.
2. What is the difference between point and nonpoint source pollution? Why does this distinction matter?
3. How do the concentrations and molecular properties of a substance determine if and when that substance becomes a pollutant?
4. What is soil and what ecological services does it provide?
5. What are four common sources of soil pollution? List and describe.
6. How is water pollution connected to soil pollution? Where does most water pollution come from?

Weekly Schedule

Monday:
- Introduction to Pollution – Pollution Case Studies

Tuesday:
- Nutshell Video & Notes
- Class discussion

Wednesday:
- Land & Water Pollution Simulation Lab

Thursday:
- Review
- Group Quiz

Friday:
- Weekly Reflection
- Career Connections OR additional work time.

Semester Schedule

Week 1: Introduction & Lab Safety

Atoms to Ecosystems

Week 2: Matter & Energy
Week 3: Cell Biology
Week 4: Biodiversity & Ecosystems
Week 5: Biodiversity & Habitats
Week 6: Midterm Assessments

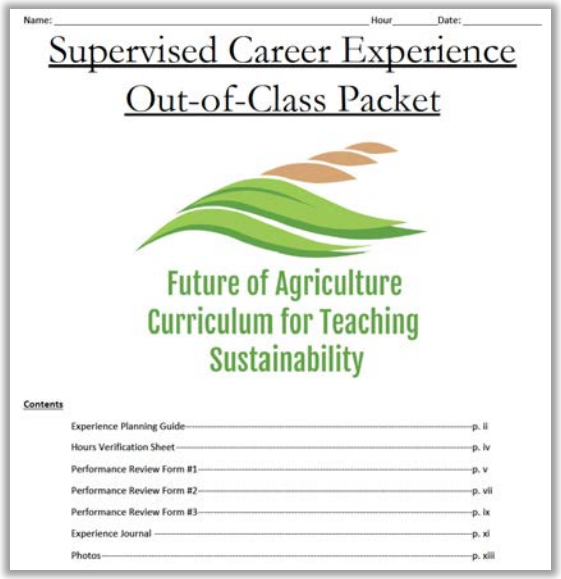
Causes of Extinction

Week 7: Extinction
Week 8: Habitat Loss
Week 9: Invasive Species
Week 10: Land & Water Pollution
Week 11: Atmospheric Pollution
Week 12: Overharvesting
Week 13: Midterm Assessments

Sustainable Societies

Week 14: Natural Resources Management
Week 15: Societies & Sustainability
Week 16: Individual

- **SCE Project**
  - 15+ hours of Authentic Career Experiences
  - Skills Development
  - Employability Assessments



Name: _____ Hour_____Date: _____

Supervised Career Experience

Out-of-Class Packet

Future of Agriculture Curriculum for Teaching Sustainability

Contents

Future of Agriculture Curriculum for Teaching Sustainability

Study Site & Participants

- **The FACTS curriculum was pilot tested in Fall 2018.**
  - Study Type: Design-Based Research
  - Study Site: Rural central-Michigan high school ag program.
  - Participants: 58 high school students (grades 10-12), 1 teacher, 1 student teacher, 1 teacher's assistant.
  - Course: Natural Resources
  - Data: weekly class observations, 2 focus groups of students, teacher interviews, pre- & post-assessments, classwork and test scores.

Future of Agriculture Curriculum for Teaching Sustainability

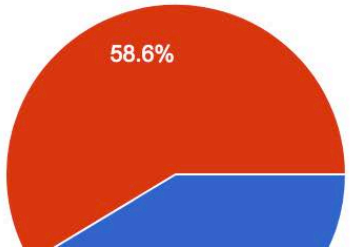
Data Analysis

- **Data analysis is ongoing.**
  - Complete findings are expected in August.
- **Data is being analyzed using the following:**
  - Quantitative Data: Chi square test of association.
  - Qualitative Data: Direct statements from the teacher/student interviews.
  - Further Qualitative Analysis: horizontalization (Creswell & Creswell, 2006).

Quantitative Data Example

You are attending a college and regularly eat in its cafeteria. The cafeteria primarily uses disposable plastic for its utensils, dishes, and cups. You can purchase reusable cups, plates, and utensils on campus at an affordable price to reduce the amount of plastic waste. What would you do?

58 responses



- Keep using the disposable plates and utensils that are discarded after every meal.
- Purchase the reusable plates and utensils and carry these every day in your backpack.

Caf Plastic	Observed			Expected		Chi Squ		X2	DF	CV	Reject H0?
	Disp	**Reuse**									
Pre	**24**	**34**	**58**	**21.75**	**21.75**	**0.23276**	**6.89943**	**16.0322**	**1**	**3.84**	**Yes**
Post	**9**	**21**	**30**	**11.25**	**11.25**	**0.45**	**8.45**				
	33	55	88								
No-till	No Till	Till									
Pre	41	17	58	44.1591	13.8409	0.226	0.72104	2.77798	1	3.84	No
Post	26	4	30	22.8409	7.15909	0.43693	1.39401				
	67	21	88								
Solar Pow	Solar	FF									
Pre	50	8	58	52.0682	5.93182	0.08215	0.72109	2.35617	1	3.84	No
Post	29	1	30	26.9318	3.06818	0.15882	1.39411				

Qualitative Data Example

- Researcher: "*Did the recycling [program participation] itself change anything?*"
- Student 1: "*My actions definitely changed after recycling. I realized how much everyone's bottles go somewhere besides recycling. It makes me realize how bad it really is when people just throw their stuff away. There is a lot of stuff just in one school.*"
- Student 2: "*I have way more respect for people who do the sorting and stuff. The little stuff that we go through… imagine the stuff that a [city] has to go through.*"
- Student 3: "*I didn't even notice recycling before or know the difference.*"
- Researcher: "*Did that have an effect that you couldn't have had without those experiences?*"
- All: "*Yeah*".

Future of Agriculture Curriculum for Teaching Sustainability

Key Findings

- **Classroom instruction was most effective when paired with authentic situated learning opportunities.**
  - School recycling program
  - Career Experiences
  - Outdoor Long-term Labs
- **Course objectives that lacked equivalent authentic experiences generally had no significant effects on intended outcomes.**
  - No significant changes to anticipated practices across the study participants.

Limitations & Challenges

- **This was only a pilot study.**
  - Analysis is still on-going.
  - Data is not generalizable.
  - Larger implementation may yield different findings.
- **Acquiring authentic career experience for all students is a major challenge.**
  - Depends on strong networks in local communities.
  - Can take years to develop.

Source: firesafetycork.ie

Discussion & Implications

- **These results lend support to the suggestion that classroom learning needs to be paired with authentic field experience.**
  - *Transfer* from classroom to careers is much less likely to occur without legitimate experiences in authentic contexts.
  - Changes to student practices depended on real-world connections outside of classroom environments.

Source: Clipart Library

Remaining Questions

- **Can this approach become more prescriptive and widely-replicable?**
- **When can lab experiences count as "authentic" enough?**
  - E.g. long-term experiences in authentic university facilities.
- **To what extent is a post-secondary classroom an "authentic environment"?**
  - More like a COP than a high school.
  - Is this enough to enable *transfer*?
- **Are research stations and research extension forms of untapped resources?**

Source: Can Stock Photo

Next Steps

- **Updates to FACTS Curriculum.**
  - Refinement of FACTS Natural Resources.
  - Development of FACTS Horticulture.
- **Full-scale testing of FACTS Curriculum.**
  - 3+ school network for data collection.
- **Summer Research w/ MSU's KBS LTER Research Station.**
  - Intent to create a model for collaboration between course instruction and field experience.

Source: carwad.net

Source: Clipart Library

- ***Access this presentation at: http://bit.ly/***

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