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

By Craig A. Kohn
Michigan State University
NACTA 2019

This material is based upon work supported by the National Science Foundation Graduate Research Fellowship Program, Grant No. DGE-1424871. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
• **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
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.

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: 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.

- **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: firesafetycork.ie
Source: carwad.net
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).

   • Effective career preparation depends on interactions with experienced professionals in authentic settings.
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
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
  - Out-of-class supervised career experiences.
  - Provides authentic links to classroom content.
  - Correlates to students’ future career ambitions, increasing motivation.
FACTS Key Components

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

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

<table>
<thead>
<tr>
<th>Caf Plastic Observed</th>
<th>Disp</th>
<th>Reuse</th>
<th>Expected</th>
<th>Chi Squ</th>
<th>X2</th>
<th>DF</th>
<th>CV</th>
<th>Reject H0?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>24</td>
<td>34</td>
<td>58</td>
<td>21.75</td>
<td>21.75</td>
<td>0.23276</td>
<td>6.89943</td>
<td>16.0322</td>
</tr>
<tr>
<td>Post</td>
<td>9</td>
<td>21</td>
<td>30</td>
<td>11.25</td>
<td>11.25</td>
<td>0.45</td>
<td>8.45</td>
<td></td>
</tr>
<tr>
<td>No-till</td>
<td>33</td>
<td>55</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>41</td>
<td>17</td>
<td>58</td>
<td>44.1591</td>
<td>13.8409</td>
<td>0.226</td>
<td>0.72104</td>
<td>2.77798</td>
</tr>
<tr>
<td>Post</td>
<td>26</td>
<td>4</td>
<td>30</td>
<td>22.8409</td>
<td>7.15909</td>
<td>0.43683</td>
<td>1.39401</td>
<td></td>
</tr>
<tr>
<td>No-till</td>
<td>67</td>
<td>21</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar Powi Solar</td>
<td>FF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>50</td>
<td>8</td>
<td>58</td>
<td>52.0682</td>
<td>5.93182</td>
<td>0.08215</td>
<td>0.72109</td>
<td>2.35617</td>
</tr>
<tr>
<td>Post</td>
<td>24</td>
<td>1</td>
<td>30</td>
<td>26.9318</td>
<td>3.08818</td>
<td>0.15882</td>
<td>1.33411</td>
<td></td>
</tr>
</tbody>
</table>
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”.
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
• 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.
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?
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
• Access this presentation at: http://bit.ly/

• Contact Info:
  • Craig Kohn: kohncrai@msu.edu

• Thank you to sponsors:
  • National Science Foundation
  • MSU Graduate School & Teacher Ed.
  • MSU Env’t Science & Policy Program

This material is based upon work supported by the National Science Foundation Graduate Research Fellowship Program, Grant No. DGE-1424871. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
