Undergraduate Research in Agriculture: Innovating Student Engagement

Mr. Rich Crow
Dr. Tom Paulsen
Mr. Chris Benson
Active Learning

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Active Learning Definition

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Collins & O'Brein 2003
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• The process of keeping students mentally, and often physically, active in their learning through activities that involve them in gathering information, thinking, and problem solving. Collins & O’Brien 2003
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http://www.msjc.edu/StudentServices/CounselingOLD/StudentEngagementPrograms/Pages/default.aspx
Drone Operations and Maintenance

This course introduces students to aerial drone operation and maintenance. Through a combination of hands-on flight and real-world simulations, successful students gain the technical and operational skills needed to become proficient in drone flight management.
The Challenge of Real-World Integration

- How do you get students involved in real-world applications with drones?
  - No crops actively growing during spring semester
  - Snow!
Real-World Research

- Parameters
  - Do something of interest
  - Do something useful
  - Do something new

- Project proposal approved by instructor
Real-World Research

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- Project proposal approved by instructor

- 8 weeks
  - Literature Review
  - Research Proposal

- 4 weeks
  - Conduct Research

- 4 weeks
  - Data Analysis
  - Present
Bovine Response to UAVs

• Literature review: no publications
• Hypothesis: An UAV can be flown within 20 feet of a bovine with no reaction
Bovine Response to UAVs

- Literature review: no publications
- Hypothesis: An UAV can be flown within 20 feet of a bovine with no reaction

Results:
Can fly within 20 ft vertically w/ no response
UAV use in Tower Inspections

- Literature review: no publications
- Hypothesis: An operator can see as much with the UAV video feed as a tower climber.
- Collaborators: Woodbury County Emergency Responders
UAV use in Tower Inspections

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- Hypothesis: An operator can see as much with the UAV video feed as a tower climber.
- Collaborators: Woodbury County Emergency Responders

Results:

Can observe all aspect except tightness of bolts from drone video.
UAVs in Search and Rescue

• Literature Review: no publications

• Hypothesis: An UAV operator will be able to consistently find a person in a timber setting twice as fast as compared to traditional search and rescue techniques.

• Collaboration: Woodbury County (Iowa) Emergency Responders
UAVs in Search and Rescue

• Literature Review: no publications

• Hypothesis: An UAV operator will be able to consistently find a person in a timber setting twice as fast as compared to traditional search and rescue techniques.

• Collaboration: Woodbury County (Iowa) Emergency Responders

Results:

Locating lost person is at least 2x faster with 1 drone compared to on foot.

Exception: if person is wearing black
Student Feedback/Results

• “I like how this forced me to practice what we learned for real”
• “I was highly motivated on this because I was doing real work.”
• “This was way harder than any class work, and more fun!”
• “Best…..class….ever…..”
  • 5.0 out of 5.0 in IDEA student feedback form for Quality Class. (Spring 2017)
Student Feedback/Results

• 19 out of 19 students indicated project had positive impact on learning.
• 17 out of 19 students indicated 4 or 5 on need to practice critical thinking skills in project
• 17 out of 19 students indicated 4 or 5 on increased confidence with problem-solving skills as result of project
Future Modifications/Short Comings

• Timing of class (spring semester)
• Number of Drones
• Number of Radio Frequency Channels
Summary

Using real world research problems, agriculture faculty can positively assist students in moving from passive observer to active participant, thereby raising the educational impact of their coursework.
References


• **Volpe EP.** The shame of science education. Am Zoologist 24: 433–441, 1984