

Undergraduate Research in Agriculture: Innovating Student Engagement

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- Requiring students to regularly assess their own degree of understanding and skill at handling concepts or problems in a particular discipline.
- The attainment of knowledge by participating or contributing.
- 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'Brein 2003

Active Learning Definition



Students engage in activities that focus on learning by using their own experiences to access their knowledge.

VS

Students mentally process information through activities that involve problem solving.



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



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 - Do something of interest
 - Do something useful
 - Do something new
- Project proposal approved by instructor
- 8 weeks
 - Literature Review
 - Research Proposal
- 4 weeks
 - Conduct Research
- 4 weeks
 - Data Analysis
 - Present



Bovine Response to UAVs

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



Bovine Response to UAVs

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Results:

Can fly within 20 ft vertically w/
no response

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



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Results:

Can observe all aspect except tightness of bolts from drone video.

UAVs in Search and Rescue

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- 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



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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

- ***Collins JW 3rd and O'Brien NP (editors). The Greenwood Dictionary of Education. Westport, CT: Greenwood, 2003.***
- ***Volpe EP. The shame of science education. Am Zoologist 24: 433–441, 1984***