Providing Professional Development to Educational Professionals for Unmanned Aerial Vehicles (UAVs) in Agriculture

Ashley Cromer
Utah State University
2300 Old Main Hill
Logan, UT 84322-2300
ashley.cromer@usu.edu

Tyson J. Sorensen
Utah State University
2300 Old Main Hill
Logan, UT 84322-2300
(435) 797-5741
tyson.sorensen@usu.edu

Kelsey Hall
Utah State University
2300 Old Main Hill
Logan, UT 84322-2300
(435) 797-3289
kelsey.hall@usu.edu

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Introduction: Need for Innovation

Unmanned aerial vehicles (UAVs), also called drones, have been used commercially since the early 1980s. Today however, practical application for UAVs are expanding faster than ever in a variety of industries. UAV technology has given the agriculture industry the possibility of a technological makeover. Specifically, UAVs give the opportunity for improved crop supervision, soil and field analyses, and the ability to more closely and timely monitor crops (Mazur & Wisniewski, 2016). In order to keep up with increasing demands, agriculture has to utilize every technology available to the industry. Based on a global report published by PricewaterhouseCoopers (PWC), the market of UAVs in agriculture is estimated at $32.4 billion (Mazur & Wisniewski, 2016). UAVs will allow individual farms to be highly data-driven, which will lead to an increase in productivity and yields. Due to the low cost, UAVs can be used for better crop management practices. Despite the growth in technology and opportunities to utilize UAV in agricultural practices, there is little being done to prepare students for careers utilizing this technology.

Methodology/How it Works

This innovative idea was implement through two professional development workshops for educational professionals in the state of Utah. A workshop titled "Incorporating Drones into my Classroom: Drones in Agriculture" was advertised to educational professionals through several listservs provided by the state office of education. The interest level from across the state was more than expected, with the first workshop acquiring a waitlist of over 70 individuals, which resulted in the workshop being offered a second time to accommodate the interest. The 8-hour workshop consisted of three different sessions presenting different topics. The first session focused on exploring various career opportunities in agriculture utilizing UAVs. The second session included presentations about rules, regulations, and licensing of drones. The third session of the workshop focused on integrating drones in the classroom. Educational professionals learned about various UAV models available for the classroom; each participant received a classroom UAV and hands on training with flying it. After completing all sessions of the workshop, participants were asked to complete a survey to determine gains in knowledge, confidence and importance of UAVs. Participants were asked to rate on a scale of 1 (*very low*) to 5 (*very high*) on the overall knowledge. importance of, confidence in use of UAVs before and after completing the workshop.

Results to Date

In total, 86 educational professionals participated in the workshops. Of those, 69 participants completed the survey. The majority of the participants were male (n = 49, 56.9%). Years of teaching experience ranged from one year to 33. Participants in the workshops consisted of elementary school teachers, secondary school teachers, 4H extension leaders, and guidance counselors. Participants represented a variety of disciplines including agricultural education, engineering and technology education, college and career awareness, general science, and computer science. Participants represented 13 different counties in Utah, spread

geographically across the entire state. Participants expressed their excitement to be able to take their knowledge to the classroom. Results of the survey were positive with statistically significant gains in knowledge (ΔM = 2.33 (n = 68) t = 27.60, p = .000), importance (ΔM = 2.25 (n = 68), t = 16.53, p = .000), and confidence (ΔM = 2.01 (n = 68), t = 18.95, p = .000).

Future Plans

Future plans include the delivery of more drone curriculum workshops for Career and Technical Education teachers in Utah. Grant funding is currently being sought to develop a professional development program that meets the needs of educators in the state. One of future goals is to develop a Career Development Event (CDE) where FFA members apply their knowledge and skills about UAVs and agriculture to solve real-world problems (e.g., pest identification using UAVs) in a competitive context. This event will enable students to demonstrate skills, such as collecting data, design and maintenance, and flying. Additionally, Utah State University has developed a course that allows students to receive FAA remote pilot certification. This course is currently being offered as Dual Enrollment credit so high school teachers can offer this training to their students through their CTE courses. Finally, professional development and curriculum development specifically with school-based agricultural educators is needed so plans are in place to continue to develop teachers and curriculum.

Cost and Resources Needed

Funding for this project was supported by a USDA-NIFA grant. Grant funding supported the cost of the UAVs for the workshop; travel for the administrative faculty involved in the project; and a graduate student assistant for assessment, planning and development of the workshops and curriculum. Each participant paid a registration fee of $20, which ensured commitment and abetted the cost of lunch for the day. UAVs were ordered from PARROT, which provides an education discount to both the university and individual teachers seeking classroom sets. This workshop utilized the MiniDrones by PARROT, specifically the Mambo Fly model. PARROT has numerous options available based on age and skill level. Each Mambo Fly costs approximately $100 each without any accessories (cannon, camera, grabbing claw). In total, the cost to conduct the two workshops and supply the participants with drones was approximately $9,000. Plus the cost of faculty salaries and a graduate student to help facilitate the workshops. It should be noted that hosting a similar workshop would not be required to provide every teacher and/or educational professional with a drone.

Conclusion/Need for Research

Of the 86 participants, 61 (89.7%) identified that they worked in a school located in an urban or an urban cluster community. It is a possibility that UAV's in agriculture may be an opportunity to engage urban as well as rural populations of students in production agriculture. We recommend that more workshops on UAV's in agriculture be offered to agriculture teachers, specifically in urban areas. By educating those who play a role in students' career decisions, more students from urban backgrounds can be prepared for careers in AFNR areas. The experiences from these workshops has been positive. Future research should include identification of barriers (e.g., liability issues) as well as the means teachers and districts are using to overcome them.

References

Mazur, M., & Wisniewski, A. (2016). Clarity from Above. *PwC Global Report on the Commercial Applications of Drone Technology, PwC Poland*, 4.