

Inservice Needs of Selected Arkansas Agriculture Teachers Related to Precision Agriculture

Instrumentation

Citation:

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Informed Consent

We are conducting this study to determine Arkansas Agriculture Teachers' interest and inservice needs related to teaching Precision Agriculture. There is no foreseeable risk as a result of participating in this study. Your participation in completing this questionnaire is completely voluntary and declining to participate or discontinuing participation at any time during this study will not result in any penalty or loss of benefits to which you are otherwise entitled. Completing the questionnaire will take about 15 minutes or less.

Your responses to this survey are anonymous and all data will be analyzed and reported on a group basis only. Data from this study will be stored electronically on one researcher's computer in a secured campus office and will be password protected. All data will be kept confidential to the extent allowed by law and University policy.

If you have questions concerning your rights as a participant, or about this study, you may contact any of the following individuals:

[Blinded]

Please indicate your consent to participate in this study by checking one of the following:

I do not consent to participate

I do consent to participate

If you consent to participate, please proceed to the survey.

Part I. Importance of and Current Ability to Teach Selected Precision Agriculture Topics

In this section, we are interested in learning your perceptions of the importance of teaching specific selected precision agriculture topics and your current ability to teach these topics. *Please read each topic and rate (a) the importance of teaching the topic to your students, and (b) your current level of ability to teach the topic by circling one number under “Importance” and one number under “Ability” for each topic using the scale below:*

- 1 = “No” (Importance or Ability)
- 2 = “Below Average” (Importance or Ability)
- 3 = “Average” (Importance or Ability)
- 4 = “Above Average” (Importance or Ability)
- 5 = “High” (Importance or Ability)

For example, the following responses would indicate a teacher rated the example precision agriculture topic as being of “High” importance to teach, and that they currently had “Average” ability to teach the topic.

	<u>Importance of teaching this topic</u>	<u>Ability to teach this topic</u>
Example precision agriculture topic	1 2 3 4 5	1 2 3 4 5

A. Realtime Kinematic GPS (RTK-GPS) uses a GPS base station and a “roving” GPS receiver mounted on a tractor or implement to determine exact field positions with sub-centimeter accuracy. *Please rate the importance of teaching and your current ability to teach each RTK-GPS topic by circling one number under “Importance” and one number under “Ability” for each topic.*

RTK-GPS Topic	<u>Importance of teaching this topic</u>	<u>Ability to teach this topic</u>
Explain the basic operating principles of RTK-GPS	1 2 3 4 5	1 2 3 4 5
Pair a tractor or implement GPS receiver (rover) with an RTK base station	1 2 3 4 5	1 2 3 4 5
Identify sources of position error in RTK-GPS systems	1 2 3 4 5	1 2 3 4 5

B. Variable Rate Technology (VRT) is used to automatically vary application rates on-the-go as the machine (planter, sprayer, spreader) is operated in the field. *Please rate the importance of teaching and your current ability to teach each VRT topic by circling one number under “Importance” and one number under “Ability” for each topic.*

VRT Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Configure a variable rate controller										
Develop a prescription application map										
Operate variable rate application equipment in the field										
Identify common sensors used in variable rate application systems										
Identify the primary components of a variable rate application system										

C. Unmanned Aerial Vehicles (UAVs)

Unmanned aerial vehicles (UAVs) are commonly called drones and are used for a variety of purposes in precision agriculture including capturing crop images for further analysis and applying chemicals. *Please rate the importance of teaching and your current ability to teach each VRT topic by circling one number under “Importance” and one number under “Ability” for each topic.*

UAV Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Manually fly a UAV										
Develop a “mission plan” to automatically fly a UAV over a predetermined route										
Use a computer program to analyze digital images to determine crop conditions										
Select the correct camera for a specific UAV application										

D. Guidance and Auto Steering Systems use Realtime Kinematic GPS (RTK-GPS) and devices such as lightbars or automatic steering systems to guide machines such as tractors, sprayers, and combines through the field. *Please rate the importance of teaching and your current ability to teach each Guidance / Auto Steering topic by circling one number under “Importance” and one number under “Ability” for each topic.*

Guidance / Auto Steering Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Set an AB line and swath width for a light bar guidance system										
Set an AB line and swath width for an automatic steering system										
Operate a tractor in the field using a lightbar guidance system										
Operate a tractor in the field using an automatic steering system										

E. Yield Monitoring and Mapping uses farm equipment such as tractors, harvesters combined with yield monitors, GPS receivers and moisture sensors to collect georeferenced data on crop yield and characteristics. *Please rate the importance of teaching and your current ability to teach each Yield Monitoring and Mapping topic by circling one number under “Importance” and one number under “Ability” for each topic.*

Yield Monitoring Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Configure a yield monitoring system										
Identify common sensors used in yield monitoring/mapping system										
Calibrate a grain moisture sensor										
Identify the primary components of a yield monitoring/mapping system										

F. Soil Sensing involves the use of sensors for a variety of purposes in precision agriculture including measuring soil properties, creating soil maps for further analysis and treatments (applying chemicals). *Please rate the importance of teaching and your current ability to teach each Soil sensing topic by circling one number under "Importance" and one number under "Ability" for each topic.*

Soil Sensing Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Select the correct sensor for a specific task	1	2	3	4	5	1	2	3	4	5
Determine when to perform proximal and remote sensing	1	2	3	4	5	1	2	3	4	5
Use a computer program to analyze soil sensor data to determine soil conditions	1	2	3	4	5	1	2	3	4	5
Determine when to perform grid and zone sampling	1	2	3	4	5	1	2	3	4	5

G. Geographic Information System (GIS) is computer software that evaluates and presents geo-referenced information and is often used to produce maps that give specific details information on lands, soil types and crop health. This information can be used to optimize the use of inputs like pesticides, seeds, fertilizer, herbicides, and water. *Please rate the importance of teaching and your current ability to teach each GIS topic by circling one number under "Importance" and one number under "Ability" for each topic.*

GIS Topic	Importance of teaching this topic					Ability to teach this topic				
	1	2	3	4	5	1	2	3	4	5
Import data into a GIS program	1	2	3	4	5	1	2	3	4	5
Determine the sources of geographic data	1	2	3	4	5	1	2	3	4	5
Create a field map	1	2	3	4	5	1	2	3	4	5
Edit a field map	1	2	3	4	5	1	2	3	4	5
Describe the coordinate systems used in GIS	1	2	3	4	5	1	2	3	4	5

Part II. Potential Barriers to Incorporating Precision Agriculture Topics into My Program

In this section, we are interested in learning your perceptions about different factors that may be barriers to incorporating Precision Agriculture topics into your curriculum. *Please read each potential barrier and rate the extent to which it is a barrier by circling one number for each item using the scale below:*

- 1 = Not a Barrier
- 2 = Minor Barrier
- 3 = Moderate Barrier
- 4 = Serious Barrier

Potential Barrier	Extent of this Barrier to Teaching Precision Agriculture			
Level of personal knowledge required to teach Precision Agriculture	1	2	3	4
Lack of curriculum materials to teach Precision Agriculture	1	2	3	4
Lack of equipment to teach Precision Agriculture	1	2	3	4
Lack of student interest in Precision Agriculture	1	2	3	4
Lack of administrator support for teaching Precision Agriculture	1	2	3	4
Lack of inservice opportunities to learn about Precision Agriculture	1	2	3	4
Precision Agriculture does not fit within the Arkansas Curriculum Standards for Agricultural Education	1	2	3	4
Other (please specify): _____	1	2	3	4

Part III. Teacher and Community Characteristics. In this section we are interested in learning how selected teacher and community characteristics impact perceptions of teaching Precision Agriculture. Please answer the following questions.

A. How many total years of experience do you have as a school-based agricultural education teacher?

_____ years

B. Which of the following describes your experience with row crop (corn, soybean, rice, etc.) farming?

(Put a ✓ on the line beside all that are true for you.)

_____ No experience

_____ Experience as part of school or college course(s)

_____ Paid or unpaid work experience on a row crop farm


_____ Grew up on a row crop farm

_____ Managing a school row crop farm

_____ Own or lease my own row crop farm

C. Do you have personal experience using any Precision Agriculture technologies?

_____ No

_____ Yes  If "Yes" please list the Precision Agriculture technologies you have used:

D. To what extent do you consider the county in which you teach to be economically dependent on row-crop farming? (Please place a ✓ in the appropriate blank.)

_____ Not at All Dependent

_____ Somewhat Dependent

_____ Highly Dependent

E. What is the postal ZIP Code for your school?

_____ (please write school ZIP code in blank)

Thank you for completing this questionnaire! The results will be used to plan inservice activities on Precision Agriculture for Arkansas Agriculture Teachers