Teaching Precision Agriculture at a California Community College

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Abstract

Planning for future employment needs of California's agriculture is the driving force behind West Hills College's Farm of the Future Precision Agriculture program. The program was initiated at a strategic planning workshop during the summer of 2000 with a 47-member advisory committee made up of representatives from agriculture, education, and WHCC. The program initially consisted of two-years (four semesters) of specialized curriculum incorporated into a traditional Crop Science Associate Degree. Due to enrollment issues and some restructuring within the agriculture department at West Hills College, in 2004 the program was switched to a 10-month (2 semesters) certificate program. The program has had great support from industry, with about 200 calls from potential employers wanting to hire graduates. The first group only graduated eight students; therefore the demand for employees greatly exceeded the supply of graduates increasing to 11 students in year two and an expected 20 students this year.

Introduction

West Hills Community College, a small California Community college located in the heart of California's agriculture, has conducted a program of instruction in Agriculture since 1948. Currently West Hills offers a 10-month (2 semester) certificate program in Precision Agriculture. In the last 10 years precision agriculture has gone from something that only a few gallant people were willing to try to more and more of an accepted industry standard. This has caused a significant growth in need for trained employees in the Precision Agriculture industry with one large aspect being Geographic Information Systems (GIS). There is a much larger demand for these employees than are graduating from colleges and universities. The problem lies in that Precision Agriculture is being developed by industry; therefore there is a lag between what is being taught at colleges and universities and what is being practiced in the field.

Planning for future employment needs of California's agriculture is the driving force behind West Hills College's Precision Agriculture program. One of the challenges agriculture will face in the 21st century, will be the management of agricultural inputs. As environmental concerns intensify and agriculture's water allotment decreases, the

demand for total production optimization, including precise input distribution, will escalate. Through recent developments in global positioning system (GPS) receivers, variable rate applicators, computer mapping and GIS software, the science of Precision agriculture has been born. Precision agriculture or site specific management involves breaking an agricultural field into different management zones with different soil characteristics and production potentials, and matching the inputs for each zone to optimize production and economic returns, and minimize the impact on the environment.[1]

Beginning of the Precision Agriculture Program

Plans to create the Precision Agriculture certificate program began at a strategic planning workshop during the summer of 2000. Representatives of agriculture, industry, government, public school and university educators, representing a combined 723 years of agricultural and education experience, met to fine-tune the needs of students and the industry, technology and curriculum and possible opportunities for partnerships. In 2001, 230 acres were donated to the college and now house the new Precision Agriculture program. It was decided that a state-of-the-art farm, Farm of the Future, would be designed to house the new program.

The Precision Agriculture program was developed through a series of Federal and State funds grants including:

a. Irrigation Technology – Department of Water Resources - $99,999
b. Precision Ag Outreach – CCCCO - $313,901
c. Irrigation Technology – CCCCO - $99,663
d. GPS Equipment – CCCCO - $29,255
e. Firebaugh Technology Alliance – Community Dev. Corp. - $50,000
f. Special Populations Recruitment – CCCCO - $16,475

The program initially consisted of two-years (four semesters) of specialized curriculum incorporated into a traditional Crop Science Associate Degree. The curriculum consisted of 24-26 units of core courses in addition to general education requirements.

Fall			Spring		
GEOG 4:	Introduction to GIS Systems	4	AGBUS 15:	Computer Application for Ag	3
CRPSCI 6:	Applications of GPS Monitoring	4	CRPSCI 7:	GPS Crop and Yield Monitoring	4
MATH 25:	Statistics	3	SLSCI 21:	Soils	4
AG 15X:	Vocational Work Experience	1-2	AG 15X:	Vocational Work Experience	1-2
			Total Certificate Units		**24-26**

Two new courses, Applications of GPS Monitoring and GPS Crop and Yield Monitoring, were created and an instructor was hired adjunct to teach these courses. The remaining courses were already being taught within the college. The first instruction began in the fall of 2001 with eight students.

The largest obstacle for this approach was a lack of students interested in production agriculture. The students complained that GPS and GIS were never discussed in their other courses therefore they had difficulty in applying the Precision Agriculture concepts to real-world applications. After three years of instruction the program only graduated one student, who currently does not work in the Precision Agriculture industry.

The New Precision Agriculture Certificate Program

Between 2003 and 2004 West Hills College's agriculture program went through major restructuring. It was decided that the focus of the agriculture program should be mainly on technology, largely on Precision Agriculture, but enrollment and the completion percentage had to greatly increase. In 2004 the program was switched to a 10-month (2 semester) certificate program. A full-time instructor, Clint Cowden, was hired to teach the program. In addition it was determined that the program should be taught as a cohort system. In a cohort system the students take all of their courses together, when they register for one course it automatically enrolls them in all of their other courses. The curriculum was changed to include 30 units:

Fall Semester			**Spring Semester**		
CRPSCI 6	Apps of GPS Tech in Ag	4	CRPSCI 7	GPS Crop & Yield Monitor	4
CRPSCI 1	Intro to Plant Science	3	CRPSCI 19	Water Management	2
AGBUS 15	Computer Apps to Ag	3	SLSCI 19	Soils	4
MATH 87	Mathematics for Life	3	GEOG 4	Introduction to GIS	4
AG 15X	Work Experience	2	G 15X	Work Experience	1
		15			15

Year 1

The first year of instruction, 2004-2005, only eight students completed the program. The largest problem was lack of recruitment; Precision Agriculture is not something that 18-year-old students think or know about. The instructor was only hired three weeks before school started; therefore the only recruiting was through radio advertisements to the local farm radio station. The problem was that they advertised during the farm hour, which sounded like a good idea, but it aired at 5:30 in the morning; not many 18-year-olds listen to the radio at that hour.

Other than the small number of students, the first year was very successful. The small student numbers allowed the instructor to spend one-on-one attention with the students. A large aspect of this program is for students to gain real-world experience; the best way to do this is for students to actually conduct projects for local farmers and consultants. This created a lot of support from local industry.

Year 2

The academic year of 2005-2006 was a very unique year, with a fairly small number of very interested students. There was still very little recruiting involved, therefore the students enrolled in the program were students who sought it out and were very interested. Out of the 11 students who graduated, six accepted positions with companies such as: Summers Engineering, In-Time, Golden State Crop Insurance, Helena Chemicals, Dow Agri-Sciences and OMC Manufacturing. Three students continued on to attend four-year universities. The students were very involved and concerned with the continued welfare of the program. Therefore they started an Agricultural Ambassadors club who's goals were to:

1. Promote higher education
2. Promote education at West Hills College
3. Promote the Precision Agriculture program.

Through the hard work of the students and instructor, the Ag Ambassadors recruited at over 32 high schools and various events, speaking to over 4,000 students.

Year 3

The Precision Agriculture program is now in year three and because of the efforts of year two there are now 22 students on track to receive their certificate this year. Most of whom already have promising jobs lined up with companies such as Reynolds Equipment, TopCON and Rust Incorporated.

The key component for this year has been industry support. Such companies as TopCON and John Deere have greatly supported the program and students; donating equipment, teaching workshops, helping create curriculum and hiring students.

Future

The future looks promising for the Precision Agriculture program, with more and more students showing interest every day. As graduates head out into industry, they are creating a reputation of excellence for the program. Some students have already been promoted into very prestigious positions and are looking into hiring more graduates. There is a continuous need for employees, we receive more and more calls every day and our reach is broadening to include construction, heavy equipment, animal science and city and regional planning.

Endnotes

[1] Eastern Seed and Oil Research – Available at: http://res2.agr.ca/ecorc/section3/precision_e.htm

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