



The Capstone Course – Benefits to Senior-Level Students in the Agricultural and Food Systems Interdisciplinary Program at Washington State University

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Abstract
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Abstract

Like many Land-Grant institutions in the U.S., over the last decade, Washington State University has consolidated several of its former department-based undergraduate programs and restructured them into multi-departmental interdisciplinary degree programs. One such degree program is called Agricultural and Food Systems (AFS, afs.wsu.edu). The AFS program comprises five different majors: Agricultural Technology and Production Management Systems, Agricultural Education, Organic Agriculture Systems, Agricultural and Food Business Economics, and Agriculture and Food Security. This successful degree program currently has nearly 200 students enrolled. At the end of their program, students take AFS 401 "Advanced Systems Analysis and Design in Agricultural and Food Systems", a senior-level capstone course. This course is designed specifically to provide a culminating experience to help in preparing students to be "job-ready, day one". Guest lectures from industry professionals challenge students on topics including developing your personal brand, project management, sales 101, private agricultural business ownership and succession planning, and the performance review process. In addition, a panel of recent graduates spend an entire class period fielding questions and sharing wisdom and advice related to lessons they have learned in their career. A fundamental part of the capstone experience is a team-based, semester-long project where groups of 5 students each work on addressing an emerging issue or problem and providing recommendations to one of several industry partners (co-ops, private companies, etc.). Students meet regularly with industry partners (face-to-face, videoconference, phone) to define their project, collect research information and develop a project plan. They prepare meeting agendas, take minutes and report back to instructors to identify what worked, what did not work, and what changes they plan to make for the next meeting. Besides introducing students to their business and colleagues, industry partners provide in-house research background information, assist in distributing employee surveys and provide excellent professional mentoring for students. At the end of the semester, student teams provide both a comprehensive written report and an oral presentation about their project and industry recommendations both to their peers and to industry leaders. The benefits and challenges of the capstone experience will be highlighted including results from both an on-line student exit survey and two facilitator-led focus group sessions with current students. Highlights of the student team industry partner projects will also be shared.

Background

Agricultural and Food Systems (AFS) is an interdisciplinary degree program that involves eight aligned disciplines that contribute to agriculture and food production: Crop Science, Soil Science, Horticulture, Entomology, Plant Pathology, Economics, Food Science and Animal Sciences. The AFS 401 capstone course is designed to support students with integrating and applying all of the skills they have acquired in previous AFS course work to analyze current challenges and opportunities in agriculture. Students are provided with the opportunity to apply scientific inquiry, critical thinking, and problem solving skills in a team setting to analyze agriscience challenges and to develop original research related to issues in agricultural and food production. By emphasizing collaborative interdisciplinary teamwork, this course replicates challenges students will face in the professional work environment. Using effective scientific inquiry and communication skills, students create an original strategy for addressing the concern or initiative that is presented to a panel of stakeholders and peers in a formal oral presentation, as well as in a written report. In order to consciously improve their ability to use scientific information to address an issue, to convey scientific information to others in an effective manner and to be a valuable teammate, students are regularly provided with constructive feedback on their scientific writing, public speaking and teamwork skills.

Data Collection

1. On-line Exit Survey: As part of a college standard best management practice, an on-line exit survey is distributed to all graduating seniors each spring semester. Responses are anonymous and are not available to instructors until after final grades have been submitted. For the AFS 401 graduating seniors, we required students to complete the survey in class as an "extra credit" opportunity. The survey was completed by all 36 students in the class. Student responses to questions related to their skill sets are summarized in Figure 1.

2. Student Focus Groups: On April 7, 2016, during a regularly scheduled 75-minute class period, the class was divided into two equal groups. Half of the students were moved to a different classroom for the activity. Thirty of thirty-six students in the class participated. Each focus group was facilitated by an Assessment Specialist from the WSU Office of Assessment of Teaching and Learning (ATL) and a note taker recorded student responses. Instructors were not present and student responses were confidential. Individual students first responded to a short paper survey. Responses to part of the paper survey are summarized in Figure 2. Afterwards, as a group, students responded to a series of questions prepared by the course instructors and members of the AFS program assessment committee. Some of the questions and student group responses are noted in Table 1.

3. Industry Partner De-Brief: In July, 2016, industry partners were interviewed by phone (30-45 min. each) by asking a standard set of questions about the course, in general, and the team project, in particular. Some of the questions and industry partner responses are noted in Table 3.

Results

1. On-line Exit Survey: For AFS 401 graduating seniors, based on their own self-assessment in the on-line survey, they reported that their skill set in eight specific areas either extremely or moderately evolved (Figure 1). Those skills that they identified with the greatest evolution were the ability to find and evaluate various (scientific) information sources, incorporating diverse perspectives to solve problems and solving problems in the context of their major. 90% of the students indicated that either they extremely evolved (50%) or moderately evolved (40%) in their ability to work well in teams to solve problems.

Results

2. Student Focus Groups: Based on the individual paper survey, there was agreement (>70%) that nearly all of the guest lectures in the AFS 401 course were very or somewhat useful (Figure 2). The project management lecture, in particular, was directly related to the industry partner team project. The two that were rated most useful by students were the panel of recent graduates and the father-son team that talked about succession planning at their family fruit farm. The guest lecture on performance reviews was rated not useful by the majority of students. Part of the reason for this was that the speaker lectured the entire class period, did not engage the students and left no time for questions and answers. Student focus groups noted that the opportunity to work on real-life industry problems in a real-world setting was a primary strength of the course (Table 1). They appreciated the emphasis on strengthening their professional skills. They identified the value in on-site, face-to-face interaction with their partners. They valued having a diverse team and playing to each other's strengths. Since most of the problems did not have easy answers, students felt challenged to provide interested partners with their ideas. Most teams were very pleased with the communication they had with their partners and valued their input and critique. They noted that they would have appreciated if more in-class time had been allotted for team project work. For a list of industry partners, the problems that the students were asked to solve and the solutions they offered, please see Table 2.

3. Industry Partner De-Brief: The industry partners overwhelmingly found this to be a valuable experience for their co-op or company (Table 3). Highlights included getting a student's perspective to their unique question, the opportunity to "preview" students, soft-to-speak, who they might want to recruit for jobs, and seeing students evolve in their soft skills over time. Depending on the project and team recommendations, some partners had already begun to utilize the recommendations while others were weighing additional input and data. Students seemed to struggle initially with problems that had no easy answer, however, once they had a face-to-face meeting with their partner and got more information, they were able to make good progress. Student professionalism, organization, willingness to respond to critique and collaborative ability exceeded many partners' expectations. All partners indicated that if they had an open position, at least one member of each team they would have considered hiring. In some cases, they said that they would hire all of them. Partners indicated that in the future, having their first face-to-face meeting earlier in the semester would be ideal. When asked, they all indicated willingness to participate in 2017.

Table 1: Selected student focus group questions and comments

Question	Student Comments
What were some of the strengths of this course?	The opportunity to work with industry in a real-world setting; real-life projects and exploring outside industries and companies; building communication skills and using different modes with industry partner (face-to-face, e-mail, Zoom web video-conferencing); it was challenging which made it worthwhile; everyone had to contribute to succeed
What were the most valuable skills that you learned or practiced?	Knowing that our professors and industry partner had high expectations of us pushed us to get our reports done early and listening to and accepting feedback from our partner; being patient with others and practicing self-control in a group setting; the recent graduate panel was really helpful; practicing public speaking skills; learning how to better synthesize information; strengthening professional skills
What was the value in doing the industry project?	Working with industry professionals and having face-to-face interactions; the on-site visit to our partners place of business (should be required); working in a group setting even if you didn't get the project you wanted – sometimes you have to get things done that you don't like; having to coordinate with people over an entire semester is character building
What skills were required to successfully complete the project?	Coordinating meetings with our team and scheduling with our industry partner; critical thinking and using strengths of different members on the team; playing to all of our strengths; creativity – we had a very open-ended problem
Was it valuable to you to do original research?	Yes, we had to reach out to a lot of organizations in order to expand on different aspects of the project – we learned a lot; it was beneficial because they were all actual problems that the industry faces every day – it wasn't like homework that others have done; both the research and public speaking were helpful; partners don't already know the answer so they are engaged and are interested in hearing our ideas
Did you prefer to self-assign or be instructor-assigned to teams for class activities?	Being assigned to groups was valuable; we had a diversity of majors on our team – this helped with the project quality; I got to be with people other than those that I would normally work with; it was awesome to be exposed to other experiences and perspectives through them
Were you pleased with the level of engagement with your industry partner? Share some specifics.	The communication with our industry partner was fantastic; we wanted more direction from our industry partner for the project management plan; we met with our industry partner every week; our industry partner was honest and told us when it was a really busy time and they could not meet with us; it was a little hard to get connected in the beginning but after our first face-to-face meeting we could see that our partner was interested in helping us
Where do you see room for improvement in this course?	It would be great to have more in-class time to work with our team on the industry project; felt we were being "micromanaged" by all of the industry partner check-in activities; the assignments could have been spaced out more; needed a more concrete example for the project management plan

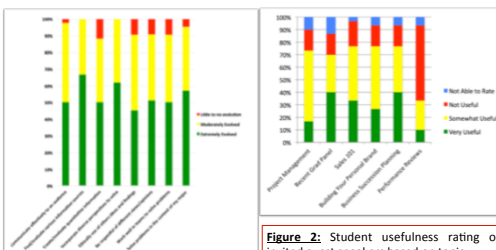


Figure 1: Student self-assessment of skill set evolution during their AFS degree program

Figure 2: Student usefulness rating of invited guest speakers based on topic

Table 2: Semester-long student team project industry partner, industry problem posed to the student team and solutions offered by the team to the industry partner

Industry Partner	Problem Posed ^a	Solutions Offered ^b
CIS PrimeLand (http://www.chiprimeland.com)	Determine location for new satellite plant	Three locations suggested and prioritized based on proximity to the new Port of Wilma plant and the strategic opportunity that each represent: 1. South of Colfax, WA; 2. North of Colfax, WA; and 3. Pomeroy, WA
Darigold ^c (http://darigold.com)	Expand current operations to include organic milk	1. Offer full product line of organic fluid milk and cheese products; 2. Consider adding new, value-added specialty products (e.g., protein bars, dairy-based cosmetics)
Moscow Food Co-op ^d (http://www.moscowfoodcoop.org)	How to grow demand for mid-level shoppers	1. Add Snapchat to social media toolbox; 2. Develop educational and promotional videos; 3. Develop new advertising flyer and promote through local businesses
NWFCS ^e – Team 1 (http://www.nwfcs.com)	Employee succession planning and customer relations	1. Transition new employees into existing leader/borrower relationships; 2. Providing financial incentive for retiring employee to mentor new employee; 3. Extend and expand new employee training program to include assigning a mentor at the conclusion of the program
NWFCS – Team 2	Expanding public awareness of agriculture in urban western WA	Invest time, funding, and expertise to partner with existing Whitman county and Washington State Farm-to-School programs; 2. Partner with others to create a new Adagio-A Farmer program for western WA
NWFCS – Team 3	Relationship lending – changing technology with the times	1. Ensure that banking app in development is as user-friendly as possible; 2. Utilize web-conferencing with tech-savvy customers (e.g., Skype); 3. Use Twitter for short updates; 4. Use Snapchat for borrowers to share time-sensitive farm information with lenders; 5. Can be achieved via an electronic manual; 5. Develop a new customer survey
Wilbur-Ellis ^f (http://www.wilbur-ellis.com)	Custom chemical application in the Inland Empire area – risks and benefits	1. Lease rather than buy equipment; 2. Establish a 5% markup on custom application practices; 3. Conduct market research on consumer trends and competitor offerings; 4. Provide excellent applicator training programs to reduce liability risk and increase customer satisfaction.

Footnotes: ^a = cooperative; ^b = commercial business; ^c = Northwest Farm Credit Services; ^d = problem posed and solution offered is abbreviated and simplified for purpose of table.

Table 3: Selected questions and comments from industry partner de-brief interviews

Question	Industry Partner Comments
How did your participation in this course provide value to your company?	Great to get a student perspective on our problem; this project helped us address one of our strategic goals of educating the community; being on campus, interacting with students, telling our story is a great avenue for recruiting; wish I would have had this kind of opportunity when I was in college; get to see where students are in terms of their actual capabilities and soft skills; a longer term period to observe them than could occur in an interview; get to see how they solve problems and work in a real-world team setting
Were the recommendations that the students provided to you something that you will implement in the future?	Yes, they did a good job in analyzing the situation; it mirrored what we did in our strategic planning; not a slam-dunk, our business is very conservative and moves slowly; Yes; their efforts will not die with me; Yes, provided relevant feedback that will be part of our culture and business practices in the future; Yes, we have already developed a Snapchat account and are using it and are planning new videos
What did students seem to struggle with the most in their project?	They struggled a bit with wrapping their heads around our business model – probably should have provided them with more background sooner; our team was great, struggling to find something to criticize; there was no "answer key" to our problem, there was no formula or preconceived outcome; difficulty in finding peer-reviewed research to support their problem; because it was an open question it was a challenge to narrow the topic down
In what areas did they exceed your expectations?	Professionalism, conduct and receptivity to feedback; teamwork, organization and professionalism; organization, leadership and collaboration – very professional; open-mindedness and inquisitiveness; they responded very well to some tough questions during their final presentation; their final report was as quality – they went above my expectations
Did you meet with the student team at your site? How was this valuable? Would you consider hiring any of the students on the team you mentored?	Yes – it helped the team understand what we were doing; Yes – face-to-face cannot be replicated digitally; company HR person chided us for not including her in the site visit (for recruiting purposes); Yes – valuable to meet our staff; see our facilities, ask questions, etc. Yes – one is working for us now; most definitely, absolutely – very professional, good base knowledge and desire to learn/understand; would consider hiring 4 out of the 5 team members; we would have hired two but one took a job with a competitor
If you were to mentor a team in the future, what would you do differently?	I would be on campus for the first meeting and it would be outside of class so not as time limited to get the team off to a good start; would provide more in-depth company information earlier; need to keep the project ideas fresh and relevant; I would push for the in-person field visit to occur earlier in the semester; I would supervise the team more closely and help them to better set the scope and milestones (basic project management stuff)
Would you be willing to mentor a team in 2017?	All – a resounding Yes; already talking with colleagues about ideas for projects great experience; a great opportunity for our organization.

Discussion and Conclusions

Well designed and executed research-based undergraduate capstone courses can provide many positive and meaningful outcomes to students (Hauhart and Grahe, 2014; McKinney and Day, 2012). They can also provide a positive means to assess the success of the student learning experience (Sum and Light, 2010). Overall, this course provided significant benefits to both students and their industry partners as evidenced by both indirect (on-line exit survey and student focus groups) and direct measures of student achievement (industry partner de-brief). Students found value in real-world experiences outside of class to address real-world problems with industry partners. Industry partners valued the student's fresh perspective regarding their problem, their ability to provide research-based recommendations and the opportunity to recruit future employees. Some student and industry partner suggestions for improvement included ensuring that guest lecturers actually engaged the student audience, starting the projects sooner in the semester and making sure that face-to-face meetings with industry partners occurred outside of class and sooner in the semester. Students and industry partners both indicated the significant value of having student teams visit their off-campus worksite for tours, meeting staff, learning more about the business, etc. Based on student feedback, some changes we plan for 2017 include providing more in-class time for team work, a reduced frequency of industry partner check-in activities and more evenly distributing graded student work throughout the semester. Industry partners who have agreed to mentor project teams in 2017 have already been challenged to come up with "fresh" new ideas for problems for students to explore. All are excited about the possible solutions they may come up with along with the potential to identify outstanding students to recruit to their business in the future.

Literature Cited

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