

Statement of Professional Contributions and Scholarship

Introduction

During the period of 2008 to 2013, the educator was employed under a 9-month, 100 percent teaching, tenure-track contract within the Department of Agricultural Sciences (Department) at Northwest Missouri State University (Northwest or University) in Maryville, Nodaway Co., Missouri. She held the ranks of Assistant Professor (2008-2010) and Associate Professor (2010-2013). Tenure and promotion was granted by Northwest Missouri State University during the 2009-2010 academic school year.

University

Northwest is a state-assisted, four-year regional university offering 135 undergraduate and 36 graduate programs. Northwest's enrollment for the 2012-2013 school year was estimated at 6,014 undergraduate and 817 graduate students, with 71 percent of these students classified as in-state and 29 percent as out-of-state students. The estimated minority enrollment during that time period was 11 percent.

Department

Northwest's Agricultural Science Department serves approximately 500 undergraduates each semester, making it the third largest department at the University. The Department offers eight undergraduate majors, five minors and a two-year farm operations certificate. The Department is served by 10 faculty members – two agricultural education specialists, two agricultural economists, two animal scientists, three plant scientists, and one soil scientist. All faculty are on 9-month, 100 percent teaching appointments, with the exception of one plant scientist on an 11-month, 50 percent teaching/50 percent research appointment.

The vision of the Department of Agricultural Sciences is to serve students and the agriculture industry by:

- Providing high-quality degree programs utilizing an integrated, interdisciplinary approach
- Developing highly trained agriculturalists with exceptional critical thinking, problem solving and communication skills
- Utilizing fundamental and sustainable technologies throughout the curriculum to prepare students for the 21st century
- Integrating theory and application to provide high-quality services to the agriculture industry and the northwest Missouri region
- Promoting and supporting the economic, socially responsible, secure and environmentally sound production of food, feed, fiber and other biological products

Regional Agriculture

According to N. Musunuru and A. Larson, agricultural economists, Department of Agricultural Sciences, Northwest Missouri State University (2012), of the 107,000 farms in the state, nearly 13,000 were located in the 15 county primary service region of the University (Andrew, Atchison, Buchanan, Caldwell, Clay, Clinton, Daviess, Dekalb, Gentry, Hamilton, Holt, Nodaway, Platte, Ray, and Worth Counties). In 2007, these farms consisted of approximately 4.1 million acres and sold nearly \$1 billion of agricultural products. The northwest Missouri region is dominated by corn and soybean production, which was responsible for \$883 million in total output in 2007, including \$87 million in labor income.

Undergraduate Soil Science/Agronomy Education

As the primary focus of the educator's position was teaching, significant time investments outside of the classroom were expended to develop a cohesive, rigorous and regionally-pertinent curriculum in the soil sciences. In addition to her teaching mission, the educator served as an academic and professional mentor/advisor to students enrolled in the agricultural discipline.

Curricula Development

The educator engaged in informal discussions with regional agronomic businesses and graduate schools to identify foundational knowledge, skills, and abilities required of entry-level college graduates in the profession. She also gleaned educational needs from discipline oriented certification exams, such as the Certified Crop Advisor and Certified Professional Soil Scientist exams administered by the American Registry of Certified Professionals in Agronomy, Crops and Soils. Once educational needs were compiled, the educator developed and updated curricula for four undergraduate soil science courses. The courses and their descriptions are listed in Table 1.

Table 1. Summary of Soil Science Curricula at Northwest Missouri State University

Course Title	Description	Schedule	Level
Soils	Introductory overview of soil genesis and taxonomy, physics, biology, chemistry and management	Three hours lecture Two hours lab	Sophomore Junior
Soil Fertility	Soil chemistry and plant nutrition	Three hours lecture	Senior Graduate
Soil Formation and Classification	Soil pedology and classification	Two hours lecture Two hours lab	Senior Graduate
Soil and Water Conservation	Soil erosion physics and mitigation; management impacts on water resources	Three hours lecture	Senior Graduate

The number of students enrolled in each course by semester is included in [Exhibit 1](#).

The educator personally created all materials used in her courses, including included: PowerPoint slides, writing, math, and project assignments, assessment materials, and laboratory exercises. A PowerPoint slide set entitled, “Soil Terminology – What we know and what we don’t know” was developed to guide student note taking in an introductory soil science course ([Exhibit 2](#)). The educator, in discussions with agricultural employers, identified a need to develop students’ written and oral communication skills. In response, several Soil and Water Conservation writing and presentation exercises were assigned each semester to encourage students to develop cohesive and articulate communications for professional and general audiences. An example assignment using crop residue as a biofuel feedstock is included, along with its grading rubric ([Exhibit 3](#)). Students were required in Introduction to Precision Agriculture to select an artifact from the campus Agriculture Museum and create video and/or audio content describing the history of the artifact and its use for the museum webpage ([Exhibit 4](#)). The educator assigned a graduate student, interested in pursuing a career in agricultural education, the responsibility for designing the online museum, collecting the students’ web content and organizing/refining it for publication on the Internet. **Grace quote**

Informal discussions with agricultural employers also brought to light the need for critical thinking-based assessments with real-world applicability within the soil science curriculum. In response, a variety of exercises were developed across courses. A Soil Fertility essay-based final exam was written to evaluate the students’ ability to provide solid advice and explanation of basic agronomic principles in a simulated consulting scenario ([Exhibit 5](#)). In Soil Formation and Classification, an experiential exercise requiring students to collect and describe a soil to professional standards from their home farm/region was created ([Exhibit 6](#)). Kevin Duerfeldt, a former Northwest soil judge and PhD candidate at Iowa State University, had these comments about the educator and her courses, “*Dr. Patton and her soils courses emphasized critical thinking and application of knowledge, and prepared me well for the demands of graduate school. She has been and is an excellent mentor. She suggested I consider Iowa State University for graduate school and I still regularly ask her for career and personal advice.*” Jeremiah Mullock, Senior Agronomist at Oklahoma State University, had similar comments, “*Dr. Jamie Patton is the best teacher I have experienced in my education, including my time in graduate school at Oklahoma State University. She makes learning about soils and agronomy exciting. Her passion comes through in her teaching. During my time at Northwest Missouri State University, she helped prepare me for my graduate studies by challenging me to look at the topics in soils critically and not to just accept the material given. She would encourage discussion and expand thinking, which helped me to view soil science not as a “black and white” topic, but as a dynamic system where all things are intertwined. This thought process has helped me to excel in my graduate program.*”

Kate Lambert, an agricultural appraiser with Farm Credit Services, wrote the following in an e-mail after completing the educator’s introductory soils course, “*Thank you for making your course so hard. When I sat in your class, I wondered when I would ever use the information in my life. In my new job as a farm appraiser, I use the information every day. My boss was impressed that I knew so much about soils just coming out of college. Thank you!*”

A summary of course schedules from the spring 2012 semester’s courses are provided in [Exhibit 7](#). During this trimester, the educator taught two undergraduate courses (Soils and Soil Evaluation), two undergraduate/graduate level courses (Soil Formation and Soil Fertility), one graduate level course (Methods of

Research), and oversaw 14 independent study projects. This was considered an 'overload', in that the educator was teaching more than the University required 12 to 14 credit hours for a 100% teaching appointment.

The goal of any educator is to impart information in a way that students are able to apply that information to real-world situations outside of the classroom. This approach to education has been dubbed "authentic learning", a current buzz term describing a learning process where students analyze and address complex problems while demonstrating skills related to long-term success in the workplace. The following are examples of the educator's success with authentic learning.

While teaching at Northwest, the educator coached one to two soil judging teams (team = four contestants) to compete in the ASA regional contest in the fall and either the NACTA or ASA national soils contest in the spring. The educator developed new coaching materials each semester, as contests were held at different locations within the United States. The educator's teams had success at three national contests, placing second or third, as well as at a regional contest, placing first in 2009. The impact of collegiate soil judging experiences on students' knowledge and skills is recognized by the soil science and agronomy industry. According to soil judge, Amanda McNeese, in a 2012 University press release ([Exhibit 8](#)) "*One of the first things employers notice during my interviews is my soil judging experience. This has allowed me to get many internship and job offers.*"

Quality undergraduate curriculum also provides students the foundational knowledge required of successful graduate students. Since 2010, nine undergraduate Northwest agronomy students have pursued Master of Science degrees. Six of these graduate students were Northwest soil judging competitors. Discipline emphasis of these nine students in graduate school is as follows: soil fertility-four students, soil chemistry-two students, weed science-two students, and horticulture-one student. Five of these students have or are near completing their PhDs in soil fertility (three students), horticulture (one student) or weed science (one student). Two students were named outstanding Master's students at their respective institutions. In feedback regarding Northwest's agronomy curriculum, Dustin Stoner, precision agriculture specialist with Hiawatha Implement, stated the following, "*The classes at Northwest that Jamie taught provided me with a strong knowledge background that helped me to succeed during my Master's career at Oklahoma State. I ended up with a 4.0 GPA at Oklahoma State and was awarded the Outstanding Master's Student for the department due in large part to the guidance and information that Jamie provided during my time at Northwest.*" Chester Grueb, PhD candidate at the University of Arkansas, also commented, "At the completion of my M.S. degree at the University of Arkansas, I have had a number of successful accomplishments the greatest of which including maintaining a 4.0 GPA, receiving the Outstanding Masters Student in the CSES Department award, and receiving the Dale Bumpers College of Agriculture, Food and Life Sciences Outstanding Masters Student award. The success that I have had throughout my graduate career would not have been possible without with the guidance, dedication to education, hands-on learning, motivation, high expectations, and friendship of Dr. Patton throughout my undergraduate studies. As a teacher and advisor, I believe that she adequately prepared me for my future graduate career in soil fertility."

To supplement in-class curricula, the educator also developed programs to 'globalize' undergraduates' understanding of agronomic practices. These programs included educational trips to Puerto Rico and the British Isles. The educator was also chosen by the University administration to participate in the first student and faculty exchange with Niigata University in Niigata Prefecture, Japan. The international experience left an indelible mark on the two students who traveled with the educator to Japan and both students cite personal and professional benefits stemming from the travel experience and faculty/student interaction. According to Mariah Stiens, in a July 24, 2012 Maryville Daily Forum press release "*Traveling to Japan was an incredible opportunity,*" Stiens said. "*I love discussing agriculture with others, and it was great to learn from people from such a different farming environment than what I am used to.*" The educator also co-lead a student study abroad trip for 14 undergraduates to the British Isles in 2009.

Sharing curricular successes through publications and presentations is an important piece of continuous quality improvement in higher education pedagogy. While faculty at Northwest, the educator published a peer-reviewed manuscript in the NACTA Journal on methods to teach undergraduates about soil temperature ([Exhibit 9](#)), as well as co-presented a workshop on hosting study abroad tours for undergraduates at the 2009 American Society of Agronomy international annual meetings to approximately 30 educators ([Exhibit 10](#)).

Teaching/Mentoring Effectiveness

Educator/mentor quality at Northwest was gauged using four indices: student course evaluations, student program enrollment, student advising load, and student post-graduation employment success. Student course evaluations were the most heavily weighted index in the Northwest tenure process.

Student Course Evaluations

Northwest evaluates its academic instructors at the end of each semester using a departmental standardized, Likert-type survey. Student perceptions of curricular and instructor quality documented through the standardized survey, as well as any additional written comments provided by the student, are compiled at the administrative level and returned to the instructor in aggregate.

The educator's student evaluation results for fall 2008 and spring 2009 consistently lower (better) (Likert-type scale where 1 = strongly agree and 5 = strongly disagree) than the Departmentally-averaged results for the seven questions identified by the Department for use in tenure determination ([Exhibit 11](#)).

Outside of the collegiate classroom, the educator was actively involved in soils education in both formal and informal settings. The educator was an invited speaker at Saint Joseph Conservation Kids Day (2012 & 2011, approximately 150 students annually), Horace Mann Elementary School (2011 & 2010, approximately 30 students), septic system profiler training for the Missouri Department of Health and Senior Services (2008, approximately 100 attendees), and Ravenwood Elementary School (2008, 20+ students). These outreach activities provided the educator the opportunity to teach audiences of diverse age groups, ethnicities and socioeconomic backgrounds.

In recognition of her teaching, the educator was awarded the following University-based awards: Interfraternity Council Outstanding Faculty Member of the Month (2010, awarded by the fraternities for teaching and service to fraternal organizations) and Indispensable Woman of Northwest (2010, recognition for education and service efforts on campus). In addition, the educator was nominated by Dr. Robert Stevenson of Fort Hays State University for fellowship into NACTA. The educator was elected and inducted as a NACTA Teacher Fellow in 2010. According to the NACTA website, its Teacher Fellow award is to "recognize those individuals whose efforts represent the very best in agricultural higher education."

Student Program Enrollment

Student enrollment in an educator's courses and discipline is primarily related to market demand for graduates, as well as a University's reputation for value and quality. In some part, a faculty's reputation within a discipline either attracts or deters potential students, as well. Over the past 5 years, the number of students specifically majoring in agronomy (Northwest does not offer a soil science major, therefore, the educator was part of the agronomy discipline) increased from 24 to 45, in agricultural science (general agronomy, animal science and business) from 37 to 55 and in agriculture – technical degree (general agronomy, animal science and business) from 16 to 19, increases of 68, 49 and 19 percent, respectively.

Student Advising

The educator's advisement load fluctuated from semester-to-semester due to graduation, attrition, and students changing advisors. Advisee numbers are related to the number of students enrolled in an educator's major program(s), as well as student perceptions of an educator's advisement quality. The educator's undergraduate advisement numbers were consistently high averaging approximately 80 advisees per semester. This was 15 percent of the Departmental undergraduates. The educator averaged one to two graduate student advisees/assistants during this time. Among the nine faculty advisors within the Department, the educator was consistently within the top three for undergraduate advisee numbers and was the faculty member advising the most graduate student thesis projects. In 2012, the educator was awarded the University's Tower Service Award for academic advising, the highest award for advisors at the University.

Jacob Vossenkemper, a PhD candidate at the University of Illinois, was one of the educator's advising success stories, "Dr. Jamie Patton has been one of the most influential individuals in my life. She was my undergraduate advisor at Northwest Missouri State University. During my time at Northwest, and through interactions in various soils curriculum, she recognized my curiosity and critical thinking skills, thus began planting a seed of interest about myself pursuing a graduate degree. At first, I had little interest, but could not reconcile my own desire, however, Dr. Patton did. Moreover, I owe my success in graduate school at Oklahoma State University, as well as my success in industry to her guidance, and appreciate her taking time to steer my character in the right direction."

In addition to formal academic advisement, the educator also mentored undergraduate students across the nation through service with the American Society of Agronomy undergraduate education division (2011-2012) as a workshop presenter, quiz bowl judge and contest organizer. The educator also served as the national co-advisor of the Students of Agronomy, Soils and Environmental Sciences (2010-2012) and the mentoring committee chair for the Association for Women Soil Scientists (2005-2010).

The educator was nominated by the Missouri FFA District One advisors for an Honorary Missouri State FFA Degree in part for her mentoring and teaching efforts at both the post-secondary and secondary level. In 2013, the educator was awarded her honorary state degree.

Student Post-Graduation Employment Success

According to the Northwest Missouri State University 2011-2012 Post-Graduation Survey, 100 percent of the 13 agronomy graduates that school year were employed within their major or pursuing continuing education ([Exhibit 12](#)). The educator assisted these students in resume and cover letter preparation and served as an academic reference for these individuals.

Soil Health and Quality

Outreach activities were not required as part of the educator's professional position. The educator pursued outreach activities to provide a service to local producers and enhance the development of pertinent classroom curricula through personal professional development and enrichment.

Outreach Education in Cover Crops

The educator, in discussions with local producers and government agencies, identified the need for producer and industry professional education on regionally relevant cover cropping systems and the importance of managing agronomic systems for soil health and quality. To address these needs, the educator sought and was awarded a \$25,409 grant to host cover crop workshops in northwest Missouri. With these funds, the educator organized and hosted two, day-long workshops. One workshop was held on the Northwest Missouri State University campus (2012) and the second was co-hosted with the Missouri NRCS at Mound City, Missouri (2013). The campus-based workshop included nationally-known cover crop specialist, Ray Archuleta, as well as several extension and industry experts ([Exhibit 13](#)). The Mound City workshop included nationally-known cover cropper Gabe Brown, as well as local producers and extension personnel. The campus and Mound City workshops had approximately 160 and 200 attendees, respectively. Feedback regarding the educational value of the campus workshop was overwhelmingly positive ([Exhibit 14](#)). Prior to the workshop 80 percent of attendees reported their knowledge of cover crops prior to the workshop was poor to fair. After the workshop, 85 percent of attendees reported their understanding of cover crops impact on soil properties was good to excellent and 82 percent reported their understanding of cover crops impacts on production systems was good to excellent. Ninety-five percent of attendees reported the educational value of the workshop was good to excellent. Written comments included: "A lot of information to take in. Very educational & informative. Look forward to trying some cover crops on my own farm." and "Added to my knowledge. More interested in using cover crops, but also more concerned about management and application."

To document the impact of these workshops on producers within the region, the educator consulted Mr. Randy Buck, NRCS District Conservationist in Nodaway County, Missouri. In an email conversation dated September 24, 2013, he commented on the implementation of cover crops in Nodaway County during 2013, "You would not believe the amount of covers that were applied via plane. We flew on close to 3,200 EQIP acres! And I am guessing another 8,000 to 10,000 acres that people put on their own. I took a total of \$1.5 million for 32 contracts for cropland accounts in Nodaway for 2013. Missouri got \$15 million total for cropland. My contracts averaged \$60,000 each with \$10,000 going to cover crop over two year period. So many people have jumped on board." The approximate 10,000 acres of cover crops planted in the county is in stark contrast to the estimated 500 acres planted in Nodaway County in 2010 when the educator was researching the topic.

In coordinating the workshops and on-campus cover crop demonstration plots, a strong working relationship was developed with Green Cover Seed. The educator facilitated an internship arrangement for a graduate student, Colten Catterton, to work for the company, while completing his Master's degree with the educator. The educator acted as a consultant to Mr. Catterton and Green Cover Seed, assisting in designing Mr. Catterton's company research and demonstration cover crop plots. As a result of this internship and his personal passion and subject knowledge, the educator mentored Mr. Catterton to present at several local meetings on cover cropping systems,

including at the abovementioned cover crop workshop in Mound City, Missouri, NRCS and Missouri Department of Conservation cover crop workshops, and Iowa soil health workshops. Mr. Catterton provided this feedback on his graduate experience, *“Under Jamie’s advisement, she led me down an educational path that would change my life and prepare me to enter my field as a specialist. She presented me opportunities which would expand my knowledge and social skills through working relationships with producers, NRCS staff and national experts.”*

The educator was one of the first academicians in the region to work with soil quality, soil health and cover crops and so, was invited to several local producer meetings to discuss the importance of nutrient management in maintaining soil quality. The educator spoke on this topic in 2013 at two regional BASF grower meetings (approximately 60 producers each, [Exhibit 15](#)), a local seed dealer meeting (approximately 30 producers), and an equipment dealership’s planter set-up clinic (approximately 30 producers). The educator served as a training specialist for the Missouri NRCS at an employee soil health workshop and presented on the importance and proper use of soil pH and electrical conductivity meters (approximately 40 NRCS personnel). In addition, the educator was invited to two Iowa NRCS producer soil health workshops as a keynote co-speaker. At these workshops, the educator co-presented with Iowa State Soil Scientist, Rick Bednarek on the basics of and importance of soil health ([Exhibit 16](#)). Post-workshop comments from these events include: *“Speaker knowledge; Good info, practical and not too wordy; I learned a lot about soil and how to treat it.”* When covering basic soils information to a general audience, the educator’s goal is to stimulate excitement for the concept that soils are alive and to leave the audience desiring additional information on the topic. Therefore, to the educator the most positive comment received on the post-workshop survey was regarding what topics attendees would like to see in the future; the answer, *“More of the same”*.

Regional Research on Impacts of Agricultural Management on Soil Quality and Soil Health

As academic faculty, the educator was responsible for conducting formal research on topics of her choosing. As a result of the educator’s collaborative efforts with University faculty, industry professionals, and graduate student advisees, the educator was co-author on a peer-reviewed article on manure application on soil aggregate composition (2008) ([Exhibit 17](#)), co-presented research on groundwater nitrate levels resulting at the Soil and Water Conservation Society Annual Meetings (2010) ([Exhibit 18](#)), and co-presented research on improving soil quality using scouring rush as a hyperaccumulator of heavy metals (2012, [Exhibit 19](#)).

Local Product Support and Development

Nodaway County Missouri is rural, home to 23,419 people, and heavily agriculturally-based, with approximately 1,400 farms in the county. Residents are poor, with approximately 26 percent of the population living below the poverty line (2010 US Census). Therefore, seeing a need for improved nutritional access, the Department began faculty-led efforts to increase local food accessibility, particularly for children and the elderly, as well as introduction of innovative and economically-viable business ideas to improve farm profitability. These efforts were directly aligned with the Department’s vision to promote and support the economic, socially responsible, secure and environmentally sound production of food, feed, fiber and other biological products.

Local Food Access

To serve the community, the educator and her academic colleagues established a 0.30 acre community garden where produce was donated to local, non-profit agencies serving low-income individuals and families. In 2011, more than 6,000 pounds of vegetables were planted, tended and harvested by volunteers for donation. The donation amount would have been considerably higher, but the garden was completely destroyed by a hailstorm in mid-August. In 2012, the garden produced more than 10,000 pounds of produce, which was shared primarily with the Nodaway County Senior Center and the Ministry Center, Inc. The donations to these two organizations benefited the approximate 220 patrons of The Senior Center and 400 families utilizing the Ministry Center’s food bank each week.

To expand upon these efforts, the educator was awarded with her graduate student, a \$49,896 grant from the Missouri USDA-NRCS in 2012 to expand the University’s People’s Garden. In addition, the educator assisted in securing an additional \$7,000 in material donations from private companies. The garden was designed to include sustainable technologies, such as rain barrels, solar lighting, drip irrigation, and green roofs, to serve as educational and demonstration garden. The garden incorporated raised beds to allow garden access for those in wheelchairs and a sensory garden, with sections dedicated to plants that simulate one of each of the five senses. As the educator’s primary professional focus was teaching, students were involved in every aspect of the project, from securing the grant to building the garden. According to Rego Jones, Northwest’s horticulture instructor *“The garden is invaluable in providing college students the training and research opportunities they need to prepare for*

careers in food production, food safety and evolving ag businesses grounded in the "eat local" movement. The garden will impact 50 or more college students each semester through its direct use in the classroom. Additionally, we will be partnering with Horace Mann elementary school to get a whole new generation of gardeners and horticulturalists excited about producing food." The garden was still under construction when the educator vacated the position for her current one.

In addition to the large community garden, small gardens were established throughout the community to serve as educational displays for children and interested community members. As part of a service learning project, the educator challenged her soil fertility class to design gardens from recycled materials from their farms. These gardens were installed at Learning Tree Day Care and Horace Mann Elementary School and were used to educate three to five year olds on planting and tending gardens, as well general plant biology (approximately 30 university students, 10 preschool students, 30 elementary students). JoAnna Baker, owner of Learning Tree Day Care, appreciated the educator's efforts to educate youth about agriculture, "Quote". The gardens, along with being educational center, also supplied fresh vegetables to both schools. Additionally, two community demonstration gardens were installed on University grounds to illustrate vertical, solar powered, hydroponic gardening and enabled hydroponic gardening using wind energy. These gardens were designed and built as part of a service learning project for University independent study students. The gardens were used to educate University faculty, staff, and students on the production of vegetables (tomatoes and lettuce), as well as ornamentals, via alternative means.

Rural Revitalization through Green Product Development

The Agricultural Sciences Department was granted state funding in the 1990's to conduct research on potential alternative crops for the region. Biofuel feedstock production was proposed as a potential strategy to improve profitability of marginal lands in the area. The educator worked with Dr. Emily Heaton, biomass specialist at Iowa State, to establish miscanthus demonstration plots on the Northwest campus. The educator's organized volunteer student labor for the digging of plants in Ames, Iowa, the cutting of rhizomes, and the hand planting of rhizomes on the University campus following established protocol. The approximate 0.25 acre demonstration plots were used for educational purposes for agriculture classes at Northwest, as well as with local NRCS and Missouri Department of Conservation personnel. The educator worked with Departmental colleagues and students to refine a method to grow miscanthus plugs to improve the speed and efficiency of establishing large-scale miscanthus biofuel feedstock fields. In 2013, the educator organized and hosted a meeting between Missouri and Iowa USDA administrators, Iowa State University, and Northwest faculty and administrators, and miscanthus producers regarding the potential and economic viability of cellulosic biofuel feedstock production in northwest Missouri (**Exhibit 20**). As a result of this meeting, a feasibility study for co-firing miscanthus with woodchips for energy at the Northwest campus was initiated and is still in progress.

Additionally, the educator worked as part of an interdisciplinary academic team to assist Nodaway County Economic Development and ChloroFill, a 'green' plywood company to assess the feasibility of large scale forage sorghum production in the region. ChloroFill wanted to use the sorghum as the primary substrate in their plywood. The educator assisted the University team in growing 90 acres of forage sorghum and was tasked with identifying cultural methods to maximize plant biomass production, as well as harvest methods that would result in harvested stalks of the desired length, moisture, and aesthetic characteristics. Research in 2012 concluded that sorghum could be produced, but not be dried to company specifications in the field. The educator and university team recommended pursuing other plywood feedstocks, such as miscanthus. Once fully operational, ChloroFill projects they will create 40 jobs in the northwest Missouri region.

The educator also served as the Departmental lead on initiating the University composting project, a collaborative project between the Sustainability Office, Grounds, Campus Dining, Auxiliary and Services, to convert food waste from the student union into compost for use in university landscaping and horticultural endeavors. This project saves the University more than \$250 per week in landfill costs alone. Approximately 100 tons of food waste is reused on campus each year. The composting effort contributed to Northwest winning the states' recycling award in 2011.

Precision Agriculture

To address increasing undergraduate desire and need for training in precision agricultural techniques as they pertain to row crop production, the educator worked with faculty in the then Department of Geology and Geography to create, obtain approval from Northwest's Faculty Senate and Board of Regents, and implement an interdisciplinary minor in precision agriculture (**Exhibit 21**). Since that time, the educator has worked to pursue

professional development opportunities in this arena with an ultimate goal of improving course curriculum within the minor through personal professional development.

Education

While at Northwest, the educator served as the sole instructor for the Introduction to Precision Agriculture course (**Exhibit 22**). As this was one of the first survey courses in precision agriculture taught in the region, the educator was responsible for creating all course materials and overseeing articulation of the course with regional colleges and universities. An example PowerPoint (**Exhibit 23**) and examination (**Exhibit 24**) are included.

The educator worked with her colleagues across campus, as well as local companies to develop industry relevant course materials. Through her work with Northwest Implement, a John Deere equipment company in Maryville, Missouri, she was able to facilitate a partnership between the dealership and the University's radio station. Northwest Implement agreed to lease space on the local radio tower for a Real-Time Kinematic repeater, which allows for sub-inch accuracy of GPS signals for their farm equipment, at minimal cost. In return, Northwest Implement provides software to access the RTK signal, as well as GPS and auto-guidance equipment at no cost to the Department of Agricultural Sciences. The arrangement has allowed for increased student access to the most accurate and up-to-date John Deere equipment and has been instrumental in the precision planting and spraying operations conducted by the Department's alternative crops program. With greater access to equipment, student enrollment in the minor increased, leading to the Northwest administration's decision to dedicate additional faculty teaching hours to the discipline in the summer of 2013. The newly created position was not filled over the summer, but recruitment of new faculty will continue this academic year.

To date, the interdisciplinary minor has served as a launching pad for intelligent and ambitious graduates to enter the precision field. For example, graduates of the minor now serve as members of the AgVisory Board of Aerial Precision Ag in Cape Girardeau, Missouri, Precision Farming Specialist with Derr Equipment in Savanna, Missouri, AMS Specialists with Northwest Implement in Maryville, Missouri and Smart Yields Account Manager with Barker Equipment in southwest Iowa.

Grants and Publications

Working as part of an interdisciplinary team, the educator sought and was awarded multiple grants. The educator was co-awarded \$4,920 to continue a US Agency for International Development project to evaluate the use of remote sensing techniques in identifying and quantifying productivity of baobab in Malawi as part of a regional economic development initiative (**Exhibit 25**). Preliminary results suggest remote sensing of baobab trees is possible, given the unique structure of the tree, but further research is needed to verify the technology's capability of estimating fruit production. The educator was co-awarded \$13,000 from the US Fish and Wildlife Service to evaluate remote sensing as a tool for early detection of invasive aquatic plants (**Exhibit 26**). This study concluded invasive species could be identified remotely with proper image selection. The educator was co-awarded \$1,260 to adapt commercial digital camera to take multispectral images (**Exhibit 27**). This award resulted in two professional presentations and numerous undergraduate research studies. The \$40,516 grant to develop a database management system to integrate GIS and the APEX model (**Exhibit 28**) resulted in an improved interface for performing long-term continuous simulations of the impacts of nutrient management, tillage, conservation, cropping systems, and other management practices on surface runoff and losses of sediment, nutrients, and other pollutants.

The educator was co-author on peer-reviewed manuscripts evaluating spatial interpretation methods of soil pH values (**Exhibit 29**). The educator was also co-author on six regional or national presentations over precision agriculture topics.

Reflection and Summary

The educator's work at Northwest Missouri State University was an asset not only to the University, in terms of increasing publicity, credibility, and public perception of its educational endeavors, but also to its students and the community at large. In addition to accumulating the traditional 'academic' credentials required of a tenured professor on campus – peer-reviewed publications, awarded grant dollars, presentations at professional discipline meetings – the educator strived to be creative in her approach to educating future agriculturalists by engaging them in her community outreach and service activities. The educator believes students learn best when they are engaged in their learning – physically, mentally and emotionally; when they are learning not just to memorize facts, but learning so they can apply that knowledge to ultimately improve themselves and their communities. Therefore, the educator engaged students as organizers, chaperones and presenters in cover crop workshops,

presentations, research and demonstration plots, which ultimately influenced the significant uptick in cover crop usage by producers in the region and will, with time, potentially improve producer profitability and environmental quality in the region.

The various garden/local foods initiatives initiated by the educator not only supplied hundreds of needy households with fresh, local, healthy food, but also provided University students with an alternative learning environment. Outside of the lecture hall, students engaged in meaningful activities while practicing real world skills – media relations, leading volunteers, working as part of a diverse (age, gender, ethnicity, socioeconomic) team, professional communications with industry and government leaders – skills that aren't typically covered in a college agricultural classroom. These skills will potentially translate into student's future professional success, an ultimate 'win' for the educator. The educator plans to transfer the knowledge and skills gained through this initiative to Shawano County by working with local farmer's market groups, as well as the local tribes, in improving access to nutritious, fresh foods. The educator plans to capitalize on professional development opportunities through the Master Gardener program, as well as the appropriate Agriculture and Natural Resources Extension program teams.

Through extensive domestic travel with students, as well as through four foreign countries, the educator has broadened and deepened, students' understanding and appreciation of the global agricultural industry, while demonstrating the applicability of general scientific principles to a wide range of situations. What she cannot document is the increase in student appreciation for his or her own country and life situation or their appreciation for diversity in person and thought. The educator cannot document the increase in personal self-confidence and self-reliance once students realize they can communicate with someone who does not speak their language, that they can travel on their own by bus, rail, or taxi, or that they can successfully live, at least for a short-time, in a place very different from the central Midwest. The educator believes these are the true successes in education. To develop the skills needed to properly document educational and program impacts on Shawano County and regional stakeholders, the educator will seek out professional development in the area of survey development and implementation.

The educator entered the profession to make a difference, to influence lives in a positive manner, so that tomorrow is a little better than today. She strives for tangibles – good teaching evaluations, published articles/manuscripts, project dollars – as well as non-tangibles – strong relationships, trust, impacting lives. Now as an extension educator, she will translate her knowledge, skills, abilities and passions acquired in the world of 'brick and mortar' into viable and meaningful programs to serve her stakeholders actively engaged in the profession. The educator will strive to broaden her knowledge of the agriculture industry, as a whole, by actively participating in livestock and farm management program teams and by taking advantage of producer and educator trainings such as the Repro Roadshow and Farm Management Boot Camp.

The educator will continue to make contacts throughout the county, state and region to broaden and deepen her understanding of the local agriculture industry and to develop a resource base from which she can draw upon when needed. The educator will build upon her previous work in agronomy and horticulture by integrating herself into the county's mix of home gardeners, commercial horticulturalists, forage producers and grain producers to identify areas for production and management improvement. She will actively engage in professional development and networking opportunities in the livestock and farm management disciplines.

However, first and foremost, as she is new to extension and the state, the educator will identify the most effective modes of communication between herself and her stakeholders. With effective and efficient communication, the educator will be better able to identify the educational needs and desires of the county and ultimately begin developing relevant programming that will have a positive impact on the lives of her stakeholders and the economic and social viability of agriculture in Shawano County and Wisconsin as a whole.