Assessment of Student Learning in the Agronomy-Ag Mechanics Division
2019 – 2020 Academic Year

Part 1 – Agronomy and Diversified Agriculture Program Learning Outcome Assessment

Students majoring in Agronomy or Diversified Agriculture are expected to meet the following learning outcomes upon completion of their degrees.

1. Students will be able to effectively communicate in oral and written form.
2. Students will be able to gather, assimilate, and process information to reach sound logical conclusions in their chosen career pathway.
3. Students will be able to apply economic principles of accounting, marketing and budgeting to agronomy enterprises.
4. Students will be able to exhibit required knowledge and skills consistent with their chosen field of study. (Technical Competence)
5. Learning outcome specific for the Agronomy Industry Management Option.
    a. Students will be able to apply economically sound and environmentally sustainable agricultural crop production practices in the Great Plains.
6. Learning outcome specific for the Diversified Agriculture Option.
    a. Students will be able to apply economically sound and environmentally sustainable crop and livestock production practices in the Great Plains.

Assessment of Agronomy and Diversified Agriculture program outcomes includes the following tools.

1. Course Competency
    a. Technical knowledge is directly measured in several key courses.
2. Capstone Project
    a. Students interested in having their own farm or diversified operation take the AGR 2943 Capstone course in which a farm/ranch business plan is developed. These business plans are assessed using a rubric based on program learning outcomes.
3. Internship Employer Surveys
    a. The results from these surveys provide feedback on outcome number 4 (technical knowledge and skills) from the employer perspective.

Course Competency Summary for Assessing Agronomy and Diversified Ag Program Outcomes

Course competency is an important tool for assessing the following two program outcomes.

1. Students will be able to exhibit required knowledge and skills consistent with their chosen field of study. (Technical Competence)
2. Learning outcome specific for the Agronomy Industry Management Option.
    a. Students will be able to apply economically sound and environmentally sustainable agricultural crop production practices in the Great Plains.

	AGR 1203 Principles of Soils	**AGR 2304 Soil Fertility**	**AGR 2353 Pest Mgmt.**	**AGR 2383 Irrigation Mgmt.**	**AGR 2403 Crop Mgmt.**	**AEQ 2323 Precision Farming**
# of Students	18	9	12	10	13	10
% of course outcomes met	92%	96%	86%	88%	97%	88%

Discussion

Overall, students continue to meet the outcomes in these courses that provide the essential knowledge and skill training in Agronomy. Achievement in the courses was sustained or slightly improved compared to last year. The evolution in replacing lectures with more applied, hand's-on learning experiences is having a positive impact on student attendance/attitude and outcome results.

Another possible positive influence on some students achieving greater success may be their participation in the crops judging team. About 50% of agronomy interest students have been participating on the team. The opportunity to learn many of the same outcomes, but in a different more hand's-on format has likely contributed to greater student success.

Use of Results to Improve Student Learning

The positive results achieved from replacing lectures with learning exercises will guide this year's changes. Efforts will continue to expand this teaching approach to connect knowledge and problem-solving competencies with non-lecture learning opportunities. A new tractor lease agreement with John Deere will expand the precision agriculture learning opportunities presented to students in both fall and spring courses.

Capstone Project Assessment Summary for Agronomy and Diversified Agriculture Majors

Rubric Assessment Scale: 1 = Unsatisfactory, 2 = Needs growth, 3 = Satisfactory, 4 = Outstanding

	2016	2017	2018	2019	2020
Number of Projects Evaluated*	4	13	17	12	14
Program Outcome					
1. Written Communication	3.5	3.0	3.2	3.2	3.1
2. Gather and assimilate information	3.5	3.2	3.3	3.2	3.1
3. Analyze, interpret and apply information	3.5	3.0	3.2	3.1	3.1
4. Apply economic principles to ag enterprises	3.5	3.1	3.2	3.2	3.1
5. Humane livestock management	--	3.1	3.3	3.3	3.2
6. Livestock waste and facility management	--	3.1	3.3	3.3	3.2
7. Livestock husbandry practices	--	3.0	3.2	3.3	3.2
8. Cultural practices are sustainable	3.8	3.0	3.3	3.3	3.2
9. Pest management practices are sustainable	3.8	3.0	3.3	3.3	3.2
10. Soil management practices are sustainable	3.8	3.0	3.2	3.3	3.2
11. Water management practices are sustainable	3.8	3.0	3.3	3.3	3.2

* Some agronomy student projects did not include both livestock operations.

Discussion

The capstone projects are most effective in assessing the program outcomes 1 to 4 in the table above. Capstone projects continue to be strong and students are demonstrating the ability to combine multiple learning experiences into comprehensive farm/ranch business plans. The changes in the Diversified Agriculture curriculum to require a minimum of 3 courses in both agronomy and livestock management have continued to result in more detailed diversified operation business plans than previously.

Use of Results to Improve Student Learning

Capstone project assessment does not indicate any major changes are necessary in curriculum.

Internship Employer Survey Results for Agronomy, Diversified Agriculture, and Ag Equipment Majors

Scale: 5 = excellent, 4 = Above average, 3 = Average, 2 = Below Average, 1 = Very Poor

	2014	2015	2016	2017	2018	2019
Appearance	4.3	4.4	4.5	3.8	4.0	4.6
Dependability/Supervision	4.1	4.8	4.6	3.8	4.1	4.2
Cooperation/Attitutude	4.2	4.1	4.6	4.0	4.4	4.5
Respect/Personality	4.3	4.4	4.9	4.5	4.5	4.7
Communication	3.7	4.4	4.3	3.7	3.5	3.9
Attendance/Punctuality	4.6	4.8	4.5	4.4	4.0	5.0
Quality of Work/Safety	4.1	4.4	4.4	3.7	4.5	4.5
Supervisory Ability/Leadership	3.3	3.9	3.8	3.6	3.9	3.9
Technical Knowledge	3.9	4.3	4.2	4.2	4.4	4.2
Overall Employability Rating	4.1	4.5	4.8	4.2	4.5	4.2
Number of Students Evaluated	**11**	**6**	**10**	**10**	**8**	**10**

Discussion

Overall employability of our students is rated at above average to excellent. Communication skills have continued to be the biggest deficiency, which reflects comments made frequently by employers. This characteristic has also been frequently observed by faculty and staff regarding the students. It is a consistent characteristic of this generation of students. Supervisory ability and leadership will always likely be a lower rating considering the age and experience of our students.

Use of Results to Improve Student Learning

Since our programs are career driven, employer feedback is an important part of evaluating our students. Most employers acknowledge that they would hire the student permanently if available. Efforts will be continued in all classes to relate instructor-student communication to necessary career-based communication, particularly with the newly restructured Agronomy Orientation course taken by all of our division's students during their first semester. Continue efforts to reinforce the importance of being a professional, maintaining integrity and a strong work ethic will be addressed in coursework through more industry and alumni interactions.

A challenge not found in the assessment data is when students return to the home farm for their internship. This exception is allowed based on a letter from the family justifying the need of the student to return home. Most years, this is close to 50% of the students and many of these student do not engage in the course requirements. A replacement for the Internship is being developed for proposal in Fall 2020 and is described in detail in the curriculum revision summary at the end of this report.

Part 2 – Irrigation Technician Certificate

Program Student Learning Outcomes

- Students will gain a foundational knowledge in electricity and mechanized irrigation systems in order to effectively and safely service, repair, troubleshoot, and install center-pivot systems.
- Students will be able to interact professionally with colleagues and clients.

Assessment of Irrigation Technician Certificate

1. Course Competency
    a. Technical knowledge is directly measured in several key courses.
2. Post-graduation surveys
    a. Technical knowledge
    b. Professionalism

Course Competency Summary

	AEQ 2801 Reinke Certification	**AEQ 1501 Intro to Electric Code**	**AEQ 1503 DC Circuits**	**AEQ 1513 AC Circuits**	**AEQ 1171 Industrial Safety**	**AEQ 2404 Mechanized Irrigation**
# of Students	7	7	8	8	10	7
% of outcomes met	100%	100%	100%	100%	100%	100%

Discussion and Changes to Improve Student Learning

This certificate program continues to be primary emphasis of our Ag Equipment program. Course enrollment was just at the sustainable level. Student achievement of SLO's was at a very high level, emphasizing that applied, hand's-on teaching greatly assists with student learning. Data support student learning is being achieved with the current curriculum. Goals for 2020-21 is to develop a Mobile Technology trailer for recruiting for this program and the agronomy program, which both have a very strong job market with more opportunities than what we have students. Reinke has indicated they would very much support this effort.

Part 3 – Ag Chemical Application Certificate and Agricultural Welding Certificate

In the Fall 2019 semester offering of the Advanced Welding course, 6 of 6 students passed the American Welding Society D1.1 1G certification test. This was easily the highest enrollment for this third and final course in our welding program. Previously, we have had only 1 student take the AWS certification exam over 5 years of the current structure. Eight students took the Intermediate Welding course in Spring 2020 with 100% achievement of outcomes and most are expected to take the Advanced Welding in Fall 2020.

Most NCTA students are choosing to receive Agronomy and Ag Equipment degrees, which includes courses for the Ag Chemical Certificate. Students in the Ag Chemical Application course are continuing to pass the Commercial Pesticide Applicators exam with a high degree of success with 6 of 7 students passing the General Standards exam in spring 2020.

Part 4 – Industry Advisory Councils

The division had planned on holding a general Ag Mechanics industry advisory meeting and an Agronomy industry advisory meeting. These will be postponed till 2020-21 once COVID-19 restrictions allow for a campus visit by the advisory groups.

Part 5 – Agronomy-Ag Mechanics Division Enrollment, Graduation and Retention

New Student Enrollment (includes spring semester starts)

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Total new students	39	26	35	19	35	23
- Agronomy	9	12	8	4	7	4
- Diversified Agriculture	16	8	21	11	17	10
- Ag Equipment	3	2	3	1	6	7
- Horticulture[1]	5	1	0	1	0	-
- Irrigation Technician[2]	6	3	3	2	5	0
- Mechanized Systems[3]	-	-	-	-	0	2
Demographics						
- Male	33	24	33	17	31	19
- Female	6	2	2	2	4	4
- Nebraska resident	28	24	32	18	26	22
- Non-resident	11	2	3	1	9	1

[1] In 2015 the horticulture program was moved from a major to just an option of the Agriculture Production Systems AS degree. Horticulture was completely removed in 2019.
[2] Irrigation Technician enrollment data are students that pursued the certificate only and not a degree. Four degree seeking students in 2019-20 completed irrigation technician courses.
[3] Mechanized Systems Management is a transfer program to UNL that was established in 2018.

Graduation, Retention and Transfer Rates for Agronomy-Ag Mechanics Students.

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
New Student Enrollment	39	26	35	19	35	23
Graduation Rate[1]	56%	69%	66%	58%	63%	---
Retention to 2nd Semester	95%	87%	91%	95%	93%	91%
Retention to 3rd Semester	57%	83%	84%	84%	74%	81%[2]
Transfer to BS after graduation	2	3	6	4	3	

[1] Graduation rates includes successful certificate completion.
[2] Expected to return in Fall 2020.

Graduation, retention and transfer data presented for each academic year is for that freshman class. For example, 35 new students enrolled in the division in 2018-19. Of these 35 students, 93% returned for the 2nd semester, 74% returned for the 3rd semester, 63% graduated in 2020. Two of these graduated students are pursuing a Bachelor's degree after completing NCTA. Division retention and graduation rates continue to exceed the average for the college.

Part 6 – Co-curricular Activities

Co-curricular activities include the Crops Judging Team, Collegiate Farm Bureau, and Ag Mechanics Club. Learning outcomes for these are as follows:

Crop Judging Team

1) Students will increase their practical knowledge of agronomy.

Collegiate Farm Bureau

1) Students will understand important issues facing agriculture in Nebraska and the U.S.
2) Students will gain an understanding of Farm Bureau's policy development procedures and lobbying efforts at the local, state and national levels.

Ag Mechanics Club

1) Students will observe an equipment manufacturing process that includes multiple versions and applications of skills encountered in their chosen career path.

Eight students participated in Crops Judging for the full 2019-20 academic year. Students must register for AGR 1891 Crops Judging I in the fall semester and AGR 2892 Crops Judging II in the spring semester. As reported in the course's SLO summary report, students achieved the learning outcome at a 100% level as documented by practice contests and two regional contests. The team placed 2nd at the 2020 Oklahoma Panhandle State contest with 2nd and 4th placed individuals. The team placed 1st at the 2020 NCTA Crops Contest with 1st and 2nd placed individuals. Nationals was cancelled due to CoVID-19.

Collegiate Farm Bureau included the following events and outcomes:

1) Lincoln County Farm Bureau Annual Meeting, September 23, 2019
    a. 11 students attended
    b. Meeting supported both learning outcomes
2) Field trip to tour Tri-County Canal Project and Roric Paulman Farms, October 10, 2019
    a. 14 students attended
    b. Trip supported learning outcome #1
3) Policy Development Session conducted by Nebraska Farm Bureau, October 29, 2019
    a. 15 students attended
    b. Session supported outcome #2
4) Nebraska Farm Bureau Annual Conference, December 9, 2019
    a. 5 students attended
    b. Conference supported both learning outcomes
5) Young Farmers and Ranchers Conference, January 31-Feb 1, 2020
    a. 4 students attended
    b. Conference supported both learning outcomes
6) Field trip to tour Case IH Combine Manufacturing Plant and State Capitol, March 10, 2020
    a. 6 students attended
    b. Field trip supported both learning outcomes

Club president Clade Anderson also served on the 2019-20 Young Farmers and Ranchers Committee, which is a great example of the impact that club participation provides to students. The Ag Mechanics Club is a new club that will be assessed in 2020-21.

Summary – Assessment Driven Changes in Agronomy-Ag Mechanics

Curriculum Revisions

Assessment for 2019-20 does not indicate the need for any significant changes in courses or curriculum within the division regarding the agronomy, diversified ag, or ag equipment related programs. Our division has lots of opportunities for hand's-on learning exercises and our faculty have worked diligently to implement more of these into the courses, which has provided more successful student learning.

For the 2020-21 Catalog year, the AGR 2201 Commercial Ag Carrier course has been discontinued. This is the course that provided students training for taking the written exam of the Commercial Driver's License. Enrollment for several years has not matched the cost of hiring an adjunct with Nebraska DMV credentials for teaching the course. The course was required in the Ag Chemical Application Certificate; it has been replaced AGR 1881 Applied Agriculture Experience, which for the certificate will be a coordinated training learning experience in combination with a Commercial Application business.

One curriculum change currently being evaluated is replacing the AGR 2903 Internship course with AGR 1881 Applied Agriculture Experience. The alternative course is very flexible in the content of the learning experience and can be from 1 to 6 credit hours. The goal would be to design a 2 or 3 credit hour learning experience for the summer period. Typically, 50% of our division internships are students returning to the home farm. Less than 1/3rd of division students seek a new job experience for the summer. A question is how valuable is employer survey data if the internship is with family. With the proposed new model of using the Applied Agriculture Experience class, a specific learning project would be developed through a meeting of the student's employer, the student, and the faculty advisor. Employer survey data would still be collected; however, the fall presentation would focus on the learning project. This curriculum change will be fully developed and proposed to NCTA's Academic Council during the Fall 2020 period.

Programs Terminated

The Horticulture option was officially terminated prior to the start of the Fall 2019 semester. The faculty member with horticulture credentials that was teaching 100% general education courses resigned from NCTA to pursue other opportunities. This fact plus enrollment of 2 students the last 4 years and an average of 1.8 students per year over the last 10 years were the reasons for terminating the program. Also, terminated was the attempt to offer an Urban Agriculture courses in Omaha. The position that was a 50/50 split between NCTA and Nebraska Extension was shifted to 100% Nebraska Extension. Over approximately 5 years, no course enrollment occurred, and industry advisory groups never developed a curriculum for the region outside of extension programming.

Equipment/Facilities Upgrades

With the termination of the horticulture program, the agronomy program greatly increased the use of the greenhouse facility to accommodate more student experimentation in courses such as Plant Science and Soil Fertility. This model will be further expanded in 2020-21. Also, the permanent tropical plant space is now being cared for by the Veterinary Technology Division to provide living space for selected animal and bird species. A few small purchases have expanded student learning in welding and ag equipment courses. The division is also working on procuring funds to upgrade welders to allow for

expanded learning and providing the opportunity for advanced welding students to pursue more AWS certifications. Current estimates place this need at near $15,000.

In spring of 2020, we also joined the University of Nebraska's lease agreement with Landmark Implement (John Deere) for annual tractor leases. This is specifically for obtaining a tractor for planting and precision agriculture instruction. For the previous 3 years, we leased a tractor from Titan (Case IH) for just planting with an April-May lease at $2500. The new lease with John Deere will provide a tractor for the entire year (200 hours) and includes the guidance necessary for planting at a cost of $2800. Primary farm use will be spring and fall crop planting; grain cart operation in the fall; and other classroom specific activities related to precision agriculture that are being developed for both spring and fall semesters. Unfortunately, we joined the agreement too late this spring, thus our tractor cost in 2020 will be $5800. This overall lease agreement is in place for the next 5 years.

New Assessment Goals.

Two major assessment projects will be accomplished in 2020-21. The first project is focusing on examining the relationship of high school curriculum, high school GPA, high school class ranking, and ACT scores to retention and graduation at NCTA. Data has been collected and initial analysis has begun. The second project is conducting a comprehensive survey of the agronomy and ag equipment industries. Key parameters evaluated will be assessment of NCTA general education outcomes, detailed soft skill analysis, and requirements for workforce readiness. Assistance with survey distribution will be sought through professional organizations such as Farm Bureau, Coops, Ag Chemical Applicators, and other industries such as Reinke.