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Agricultural Education and Students with Exceptionalities

Meeting the Needs of All Learners

by Dr. Gaea Hock

During my son's two-year old wellness check they asked how many words he could say. I responded, "not that many." At that point in his development Jasper should be saying around 50 clearly understood words. As the months passed, I paid more attention to what he was saying, and not saying. Finally, I called to get an assessment done to identify where he was and what we could do to help him. After that initial phone call, I have been very impressed with the level of attention and dedication from the professionals tasked with early intervention efforts. Jasper is doing well with his receptive language, but struggles with this expressive language. We have a few more months of in-home speech therapy before he will transition to receive support from the local school district (at age 3).

This issue of the Magazine focuses on meeting the needs of all learners, especially those with exceptionalities. My son currently qualifies as a member of this unique group and I have gained a new appreciation for all the work involved with meeting the needs of these learners.

Who are learners with exceptionalities?

Learners with exceptionalities are "those individuals whose physical, behavioral, or cognitive performance is so different from the norm that additional services are required to meet the individual's needs" (Pearson, 2021).

There are many different categories of "exceptionality" including mental retardation, giftedness, physical disabilities, visual disabilities, hearing disabilities, learning disabilities, emotional/behavioral disorders, speech disorders, language disorders, and autism. Within each of these categories there are different levels and types of impairments.

Disability refers to a functional limitation a person has that interferes with physical or cognitive performance. (Pearson, 2021). *Handicap* is a "limitation imposed upon a person with a disability by society, such as lack of access for people in wheelchairs" (Pearson, 2021).

As you work with students with exceptionalities, make sure you are connected to the special education teachers and staff in your building(s). They will be your greatest resource and can provide you support teaching the student and interacting with parents/guardians. They can help you better understand each students' skills and the needed modifications/adaptations required, how to best organize and facilitate learning activities, strategies for working with students individually and in group settings, and interpreting individualized education plans (IEP) language.

Tips from my experiences and research:

- Build a relationship with each student.
- Slow down and listen. Be patient
- Plan your lessons out in advance and build in the neces-

> Respect the individual and do your best to meet each student's unique learning needs.

sary accommodations/adjustments. Do your best to plan lessons to include all students and vary the strategies used. Also work to address multiple modalities so learning can happen in a variety of ways.

- Chunk the content in sections to aid in learning each component before moving to the next
- Differentiate your instruction by changing the level you teach the content, the way you teach it, and the way students show they learned. Provide choices that will encourage student engagement and ownership.
- Communicate clearly (to parents, other teachers, and students)
- Help other teachers in your building/district/profession teach each student.
- Ask for help when you need it.
- Find joy in each day and in each student!

As you read each of the following articles, reflect on how you are working to meet the multitude of learning styles, requirements, and preferences of the learners in your classroom. Remember – people come before labels. Respect the individual and do your best to meet each student's unique learning needs. You've got this!

References:

Slavin, R.E. (2021) Educational Psychology: Theory and Practice (13th ed). Pearson.

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Agricultural Education and Students with Exceptionalities

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The Fourth Circle of Agricultural Education

by Dr. Kathryn Teixeira

While debate on whether the three-circle model of agricultural education is relevant today, I think back to my time as an undergraduate student at Cal Poly, San Luis Obispo. Mr. Gerald Clark was an integral part of my decision to become a school-based agricultural education instructor. One of the most memorable classroom discussions I remember Mr. Clark leading centered around the three-circle model. As a class, we identified the three circles (Classroom, SAE, and FFA) but Mr. Clark told us about another very important circle—one that encompasses all of the other circles; The Fourth Circle of Agricultural Education: Community.

Alone, the three circles represent what happens within our agricultural programs; Classroom, SAE, and FFA. But how do we decide what we teach? What SAEs are successful in our areas? Who are the strongest supporters of the agricultural and FFA programs? The answer to each of these questions is the community.

It's been more than 15 years since I sat through that discussion, and it still resonates with me today. As I worked with the contributing authors for this issue of the AgEd Magazine, I was reminded more and more about the fourth circle. The people we surround ourselves with in agricultural education are the people who will help us lead a successful program. Our community members support school-based agricultural education programs by guest speaking in agriculture classes, helping coach CDEs, fundraising for and driving students to conferences, and supporting students who go on to college through scholarship programs. The success of the agricultural education program rests on the help from those around us.

Okay, so you're probably wondering... what does all this talk about the fourth circle have to do with this issue of AgEd Magazine? Well, the simple answer is... EVERYTHING!

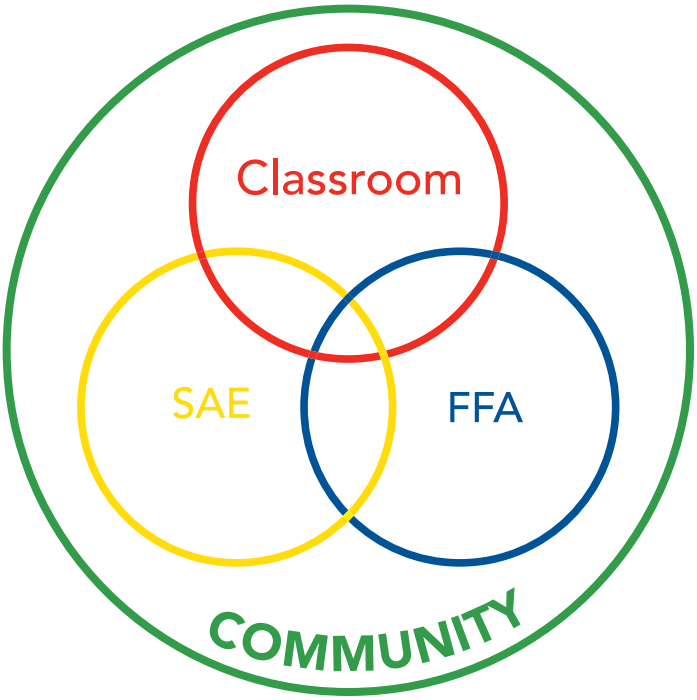
There are essentially three things we can take away from the fourth circle when it comes to working with and helping students with special needs.

1. The RIGHT people are willing to help when you ask for it.
2. Go outside of your four walls and see what others are doing.
3. Give opportunities for students to contribute to the community.

The RIGHT people are willing to help when you ask for it.

In this issue, you're going to hear about some extraordinary programs and groups that are doing great things for students with special needs in their area. While it may seem like a heavy lift, none of these people and projects have gotten to where they are on their own. Each person is surrounded by a team of experts and volunteers that help them achieve their program goals.

I remember multiple instances where some of my students with special needs were really struggling in class... and I was struggling with the fact they were struggling. I worked closely with the paraprofessionals that were assigned to my students and developed a working relationship with the teacher in our special education department. Lucky for me, their break room was just across the way from my class-



The Fourth Circle of Agricultural Education: Community.

room which allowed me to pop in and ask for help with accommodations and/or adjust lesson plans and activities for the students. My relationship with the special education department didn't happen overnight but I felt immediately welcomed by them, and found some great mentors through those conversations.

One of the greatest allies to our agriculture department was the transportation supervisor at our school. In addition to always getting the best vans for our FFA trips, he also became like a bonus advisor for our chapter! On multiple occasions he would drive students to CDE and Leadership events and even attended the State FFA Leadership conference with our chapter. His involvement with the Backcountry Horsemen was an integral part to our FFA Member Awards Trip and his relationship with our faculty led to one of the coolest Living to Serve opportunities for our students. Over the course of three summers, I had the opportunity to take students into the Trinity Alps to work on three different trail restoration projects. More than half of the students that went on this trip were students on IEPs who were enrolled in our courses and active members of our chapter. This opportunity presented itself as a physical challenge for all the students, but also gave them a chance to bond outside the watchful eyes of potentially judgmental peers.

Go outside of your four walls

While you might think your impact is best felt in your classroom or on the school farm, get out into your school and see what your students are doing in other classes. If your school has a program for you to substitute in other teachers' classes during your prep, take this opportunity to see what systems and routines teachers have in place. I found multiple opportunities to connect with students when I interacted with them outside of my classroom.

If you are invited to IEP meetings for your students, even if they are not required of you, make an honest effort to attend! With special education students enrolled in my Ag Science class, my class was often the only mainstream class my students had outside of their designated special education classes. By attending the IEPs I learned a lot about my students, met their parents/guardians, and made a connection with school counselors and psychologists. This is also a great opportunity for you to pump up your students about their involvement in your class and your school-based agricultural education program with compliments, or maybe address some concerns.

Give opportunities for students to contribute to the community.

I am no longer in the high school classroom, but I can tell you some of the greatest memories with students happened outside of the classroom and outside of the "normal" Ag teacher duties. Show students what it is like to give back to the community through community service. Incorporate projects into your Program of Activities that are designed for the students to interact in hands-on activities.

One of the most humbling experiences of my years as a high school agriculture teacher was working with the local VFW post on Memorial Day to place flags at the local cemetery. I didn't think it possible to have 20 to 30 students volunteer at 6am on a Monday of a three-day weekend, but this event was one the students looked forward to every year. Activities that engage your students in the community are important because they allow students to see the value of service to the community and the added bonus, they give students with special needs an opportunity to be just like every other student in your program. You don't need an IEP to place flags for Memorial Day, there are no accommodations necessary to honor our servicemen and women, and to honor your community. The relationships within your community are the backbone to your SBAE program. Invest wisely in the community that invests in you.

I would like to finish by sharing my gratitude to the authors who contributed to this issue of *The Ag Ed Magazine*. It is through your hard work and dedication to students with special needs we continue to break barriers in agricultural education and provide opportunities for students of all abilities.

Dr. Kathryn (Katy) Teixeira earned her Bachelors and Masters from Cal Poly, San Luis Obispo and completed her Ph.D. at Oklahoma State University. She taught high school agriculture for 7 years in Northern California and will start her third year as an Assistant Professor in Agricultural and Environmental Education at University of California, Davis this fall.

"Different... Not Less"

by Robby Branscum, Tanner Nipper, & Bailey Kliewer

Each year, our introductory agriculture courses watch *Temple Grandin* and are introduced to the extraordinary work of Dr. Temple Grandin as an animal agriculturist and see her live out her words "Different... not less." We discuss the meaning of these words with regard to those with special needs, and students share their insight on how we can each be more inclusive, supportive, and understanding of others who face challenges to which we might not relate. Still, it is hard to fully grasp these lessons without experiencing situations requiring the need to include those with unique challenges.

For the 250 students enrolled in the Stillwater Agricultural Education Program in Oklahoma, our program likely did not appear to be the ideal situation for a "Different... not less" environment. A unique aspect of our program is our students travel each day to the off-campus 20-acre school farm for agriculture classes. The agricultural education teachers are the only faculty present on site, and each responsible for our class of students. The farm is well equipped for teaching agricultural education, but resources available on the main district campuses for students with special needs, such as administrative support, paraprofessionals, and calm down rooms are not immediately available. However, a transformation of our members and instructors began in 2016 when Matt Sitton enrolled in eighth-grade agricultural exploration.

On paper, Matt's list of accomplishments is as impressive as any: Second-place National FFA Agriscience Fair, Oklahoma FFA State Proficiency Award Runner-Up, chapter officer, Oklahoma State Fair breed champion lamb, and soon-to-be recipient of the American FFA Degree. While his list of accomplishments easily sets him apart from his classmates, Matt is a young man with Down syndrome and faces struggles different from what any of us have or ever will experience. Working with Matt during the last six years, we experienced highs and lows through all three circles of agricultural education but also witnessed a positive transformation in Matt as well as his classmates, advisors, and loved ones. While Matt is just one example of the many students with special needs in agricultural education programs throughout the nation, we wanted to share our lessons learned from our role on *Team Matt*.

Surround Your Student (and You) With a Support System

As Matt enrolled in his first agricultural education course as an eighth-grade student, each

(LEFT) Matt works in the Greenhouse with his Agriscience Fair Partner at Ag Teacher, Robby Branscum on different planting mediums for their research project.
(RIGHT) Matt and his Agriscience Fair partner, Wren Cavins at 2018 National Agriscience Fair.

of us had three or fewer years of teaching experience and no specialized training with regard to special education. Our biggest fear was we were not prepared to fully serve him and direct him on a path for success. While we were no experts on Matt or working alongside students with special needs, several other people with expertise stepped in and were happy to help. We soon learned the importance of developing a strong support system, which his mother affectionately refers to as *Team Matt*.

One of our greatest resources was Ms. Marsha Nash, a special education instructor at Stillwater Junior High School. While Ms. Nash would be the first to admit she was no expert on sheep or agriculture, she has an incredible gift for working with students with special needs. As Matt began his FFA journey, Ms. Nash was the link to connect Matt's academic journey with his agricultural education experience. She was often seen at livestock shows, at Matt's house helping him feed sheep, or around the agricultural education facility. For those agricultural education instructors feeling ill-equipped to best serve students with special needs, find and build a working relationship with the Ms. Nash at your school, and ask for his or her guidance and support for your program.

Heading into Matt's senior year, he decided to run for an FFA officer position. Matt was at the top of the list of deserving candidates and was elected as the chapter chaplain. In earning this prestigious position, Matt was required to sign an officer commitment form with a number of expectations, attending all officer and chapter meetings, interacting and encouraging his fellow members at events, and even planning one of our monthly meetings for which he was the officer in charge. We recognized Matt's commitment and knew having a chapter officer with special needs would include additional work on our part. While the same level of commitment and quality to the officer position was required, we also realized help from Team Matt would be needed for Matt to be successful. A simple adjustment we made was sending officer email updates, typically sent just to officer team members, to both Matt and his mother. Also, at our officer planning retreat, Matt had assistance in designing and sharing his meeting idea presentation.

> Helping your students find their area of passion and reaching their full potential is how we best ensure our students with special needs enjoy an agricultural education experience that might be different, but not less.

(LEFT) Matt's SAE included a flock of breeding ewes and market lambs he showed during his FFA career. (RIGHT) Matt competed throughout the state of Oklahoma at the local and state level shows with his breeding flock.

This experience also served as an example to the officer group on the benefits of working on a team and helping one another accomplish goals. While Matt's officer team experience might have been slightly different than his teammates, his experience, expectations, and input were certainly not less thanks to the support of *Team Matt*.

FFA is a Student-led Organization – Let Your Members Take the Lead

Team Matt is full of incredible people who love and inspire Matt and includes his family, Ms. Nash, sheep breeders, FFA advisors, and a number of his mother's students who helped make sure he was always cared for and where he needed to be. There was also a network of Stillwater agricultural education students and FFA members who served an integral role on *Team Matt*. The relationships between Matt and classmates were certainly symbiotic. Students assisted Matt in class and at FFA events. In addition to experiencing the joy Matt brings to a room, the students also gained life-changing lessons in servant leadership.

Matt's first overnight FFA trip was the Made for Excellence Leadership Conference, hosted at a hotel about an hour from home. Prior to the event, *Team Matt* created a plan of action to make the experience successful for all involved. In addition to the FFA Advisor chaperones, Matt's mother traveled to a hotel near the conference site and stayed nearby, although Matt never knew she was so close. We also put great thought into who would be the best roommates for Matt. We conducted our usual room checks at the end of the first night of the conference and left Matt with his roommates. The next morning, Matt came down to breakfast, in full FFA official dress, ready for the next day of the conference. His roommates ensured Matt was ready for bed, woke him up the following morning, and helped him with putting on his FFA official dress. There were moments when Matt's leadership conference experience was different, but it was far from less because of the support he received from peers.

One lesson we learned from our journey with Matt was that the experience is more authentic when student leaders guided him. During group projects in class, Matt was strategically placed with students who supported him but also were determined to include him in group responsibilities. On bus trips to FFA competitions, Matt always wanted to give pep talks to his peers to help them catch his contagious Stillwater FFA Spirit. After each motivational spill, his peers erupted in applause. We soon realized affirmation from them meant far more than from the adult members of *Team Matt*. As agricultural education instructors, we search for ways to allow our students to follow the FFA motto of "Doing to Learn." Providing students the opportunities to serve and include those with unique needs is a powerful method of living out the FFA motto.

(LEFT) Senior year banquet, Matt won Chapter Star in Ag Placement for his SAE at Cimarron Animal Clinic.

Take a Deep Breath "Plan A" Often Fails

All students who embark on a multi-year agricultural education journey will experience peaks and valleys. For Matt, his greatest challenge was "getting stuck" at which time he would shut down and refuse to move. Matt would often get stuck at the most inconvenient times, such as the holding area of a sheep show. Matt thrives on structure, and any adaptation to the plan was often met with resistance. Going into show day Matt might have planned to enter the show ring three times, but suddenly the selection of his class winner for breed champion meant he needed to enter the ring a fourth time for champion drive. While an awesome opportunity, Matt was stuck in place, refusing to move forward.

In these moments T*eam Matt* experienced the greatest growth from year one to year five. While our initial response might be frustration as the rest of the show waited, we learned this would simply cause him to shut down further. We realized others in attendance at the show were not frustrated by the delay – they all wanted Matt to succeed! We learned to take a deep breath and encourage and motivate Matt. Sometimes the encouragement and motivation came extrinsically through offering a cheeseburger as a reward once he was done showing; we smile at this thought because everyone on Team Matt knows how much he

loves cheeseburgers. Reminding Matt of his duty to represent his program would often snap him back into action because was also very motivated through his pride for Stillwater FFA and through his role as an officer. As you work alongside students with special needs in your program, it is essential to have a plan, but realize sometimes your first plan will fail miserably. As with all students, remember to take a deep breath, find others way to connect with the student, and give yourself and others plenty of grace.

Find Ways for Them to Shine

If you reflect on what motivates many of the students in your agricultural education program, oftentimes it is some type of success. As you welcome students with special needs into your classroom, think about how you can place them in situations to shine. For Matt, it was the FFA Agriscience Fair. During his final four years in FFA, Matt was teamed up with two amazing students, Wren Cavins and Madison Zweiacker, who worked with him through research projects involving plant growth and aquaponics. He connected well with his partners and enjoyed the projects where he worked providing daily care for the plants in their research studies. During the Agriscience Fair presentations, Matt presented the introduction and final remarks of the team presentation while his partner shared the research details in the middle. These powerful teams placed in the top three at the National FFA Agriscience Fair on three separate occasions.

From his pep talks to fellow FFA members to competing in FFA Creed and Agriscience Fair or grabbing the microphone at a livestock show, Matt shines brightly through public speaking and inspiring others. As you work with students with special needs, ask the question – where can these students shine? Helping your students find their area of passion and reaching their full potential is how we best ensure our students with special needs enjoy an agricultural education experience that might be different, but not less.

YOU Can Provide an experience that is Different... not Less

As our students experience Temple Grandin's story, they witness the journey of a young lady blessed with a support system who pushed her to accomplish tasks that were often uncomfortable. While her journey was different, and often difficult, it led to many remarkable accomplishments. In the same way, we had a front row seat to witness Matt's FFA journey. He was also blessed with a support system who pushed him to accomplish tasks that were often uncomfortable.

Later this year, Matt will hang up his FFA jacket as one of the most impactful and successful FFA members to ever come through our program. As teachers, we are sometimes tasked with teaching students from unique circumstances who we feel completely unprepared to accommodate. Thankfully, we found helping our students with special needs is a team event and not a solo act. By creating a support group of students and adults, giving each situation grace, and finding an area they can shine, each of us can create an agricultural education experience that might be very different, but certainly not less.

To learn more about Matt and his Agriscience Fair experience:

Robby Branscum is an agriculture teacher and FFA Advisor at Stillwater High School in Stillwater, Oklahoma. Mr. Branscum teaches introductory agriscience courses for 8th and 9th grade students.

Tanner Nipper is an agriculture teacher and FFA Advisor at Stillwater High School in Stillwater, Oklahoma. Mr. Nipper teaches courses in the natural resources and agriculture power, structures, and technology pathway.

Bailey Kliewer is an agriculture teacher and FFA Advisor at Stillwater High School in Stillwater, Oklahoma. Ms. Kliewer teaches courses in the animal and plant systems pathways.

Dear Agricultural Education Teacher:

by Tim Klaiber

After more than 30 years working in special education, I will be retiring at the end of this school year. Growing up an urban city dweller, I had never seen or even heard of an agriculture program at the schools I attended or even in the college I went to in the Los Angeles area. I can still remember my first week at Anderson Union High School where I actually heard country music being played and saw students wearing cowboy hats. I was also surprised when I saw a swarm of students wearing blue jackets with yellow writing on them. To be honest, it took a good year to realize this was something more—something much, much more.

During my first year as a special education teacher on our campus, I noticed a high number of students on our IEP caseload opting to take Ag Science over any other science classes being offered, including our modified science program designed for our students who struggled with reading comprehension and writing abilities. Our special education students were passing their Agriculture classes, and working alongside their mainstream peers in both the Ag Science and Ag Mechanics classes. It kept them out of the special education classes and provided mainstream opportunities for them to interact with students outside of our classes, so I thought great, keep it going.

As I entered my second year at Anderson Union High School, the trend of students opting for the Ag Science and Ag Elective classes over other courses continued. It was then I realized I needed to look a little deeper into this. My interest was piqued by the chatter from students in my classes about the projects they were working on in their agricultural education classes. Students were talking about walking down to the school farm to work with animals, working on hands-on building projects in agricultural mechanics, and getting to plan and build their own welding projects. In addition to their talk about in-class activities, I also saw an interest and excitement about being in this group called "FFA."

> "I cannot tell you how many times I have heard, "If it wasn't for my ag teachers, I would have never made it out of high school."

Getting to know the teachers in our agricultural education department over these past 30 years has convinced me why students who tend to struggle elsewhere on campus, don't within your realm. I believe it is two-fold. First, I believe you accept these students into your ranks as they are, but you put expectations on them as far as conduct. They seem to fall in line because they want to be a part of this "school within a school." Secondly, I believe you offer a variety of activities such as animal raising, Christmas tree cutting and drive through BBQ fundraisers, hands-on activities at the school farm, applied learning classroom activities – all of which our IEP students do not feel overwhelmed by.

I have appreciated the communication most of all. Our special education department staff was embraced as surrogate Ag teachers it seems. The Ag Department staff at our school does a complete job when it comes to communicating with our Special Education staff. Likewise, our agriculture teachers advocated for our students at every level, from IEP meetings to recommendations and support for leadership events, internships, and work study. Our special education department always felt supported and enjoyed working together with our agricultural education program. The transparency and communication from our Ag Department has been the biggest blessing for our SPED department.

In closing, I am grateful to the agricultural education teachers who took this city boy teacher in and showed him the ropes of how an agricultural education program builds leaders and increases students' self-confidence and career opportunities after high school in a small semi- rural community. It has been a good run for me... after 30 years, I am a better teacher and person because I have had the privilege of being a part of the agricultural education experience.

My greatest joy comes when I run into former students who struggled in school and we didn't know if they were even going to make it to graduation, let alone find a career and be successful. To see them now in their 20s, 30s and some even in their 40s, their stories of landing on their feet, finding successful careers and building families of their own are why we teach!

Our students who were in agricultural education have all said the connection they made with the Ag staff and the program itself made them stick it out through high school. I cannot tell you how many times I have heard, “If it wasn’t for my ag teachers, I would have never made it out of high school.” I believe the many students who I have bumped into and shared their adult successes have done so because of the agricultural education program at our high school.

From this special education teacher to Ag teachers everywhere… What you are doing matters! Thank you for including our students in your agricultural education programs and making their high school experience far better than they thought it would be. Thank you for working diligently to provide for our students and helping our students to not only embrace the whole concept of the agricultural education program, but also giving them a home where they can grow and succeed!

Sincerely,

Mr. Klaiber

Tim Klaiber has more than 30 years of experience teaching students with special needs. He is a special education teacher at Anderson Union High School in Anderson, California.

Is Some Inclusion Enough Inclusion?

by Dr. Joy Morgan & Dr. Kristin Stair

As agriculture teachers, the importance of the three-circle model is ingrained through college coursework and again in professional development workshops once we enter the profession. We also stress that importance to our students as many of us spend our first weeks of the semester teaching our students about the three-circle model and how critical it is to the success of the total program. We often talk about how this model is intracurricular and an essential piece of what we do in agricultural education and what makes our program so unique.

> As teachers, we must commit to answering "yes" to being inclusive of all students by utilizing strategies and establishing an inclusive environment within our classes, FFA chapters, and SAE programs.

When working with students with diverse learning needs, the total program model is a key piece to help all students feel supported and included while allowing them to explore future career options in agricultural education. Despite this importance, very little research has been done to identify how teachers are working with students with diverse learning needs in FFA and SAE. The research that has been done suggests teachers are less likely to include students with special needs in FFA and SAE.

So how do we begin to change that? If the total program is important, then it is critical we identify ways to include every student in all aspects of agricultural education. Here are a few questions for you to consider about your program:

1. Is my chapter representative of my school's overall population?
2. Can you identify specific strategies that you implement in your classroom, FFA chapter, and SAE expectations that promote "Agricultural Education for All"?
3. Have you ever encouraged a student with an IEP to participate in a CDE competition?
4. Considering your National FFA Week activities, are the activities something that all students enjoy and can participate in or do they cater to one group within your program?
5. Do you recognize different cultures and the contributions of those cultures in your classroom?

If you answered "no" to any of the questions above, you are not alone. Agriculture teachers have identified and shared many barriers they face when promoting an inclusive agricultural education program. However, even though we face barriers as agriculture teachers, we must strive to overcome these challenges and provide our students with an experience that allows them to gain confidence and be a part of a community that supports and values them for who they are.

Barriers Identified

So why aren't we doing it already? Of the research that has been done, teachers have identified several barriers to including students with diverse learning needs in the total program.

- Lack of opportunities to conduct SAE projects (Johnson et al, 2012)
- Student ability to conduct SAE projects (Johnson et al, 2012)
- Limited models of agriculture at home to support concepts like SAEs (Pirtle, 2012)
- Facilities that don't meet student needs (Johnson et al, 2012)
- Need for additional professional development training for working with students with severe disabilities (Ramage, 2021)
- Securing resources for students with diverse needs in FFA (Ramage, 2021)
- Lack of clarity surrounding modifications and accommodations at FFA events (Morgan et al, 2022)
- Student ability when participating in FFA contests (Johnson et al, 2012)
- Emphasis and pressure on competition versus experience (Morgan et al, 2022)
- Time (Johnson et al, 2012)
- Lack of parental support for FFA involvement (Johnson et al, 2012)

To combat some of these barriers, there are multiple ways teachers can work to engage all students in FFA participation and SAE projects.

Classroom and Laboratory Strategies for Inclusion

- Pass out an in-depth student survey on day one of school to every student. In this survey, ask them questions about their interests, school involvement, outside responsibilities, how they learn best, and any challenges related to learning. This will provide you with details for all of your students, not just those with an IEP or 504 plan.
- When providing modifications and accommodations, try to do this in a way that does not "call" out your students. Schedule tests and quizzes at the beginning of class to allow students to report directly to the separate setting location instead of in front of their peers to go to a different location.
- Strategically plan group assignments. Yes, this does take time, but it eliminates the "no one wants me in their group" issue. It also allows you to create groups that can support students who may have additional needs.
- Celebrate diversity and culture. Create a diversity awareness calendar to help you plan and deliver lessons that support and acknowledge the contributions of all.
- Utilize assessments that are a mix of traditional tests, as well as hands on skills, projects, and presentations to give students a chance to show what they know, even if they struggle with traditional testing.
- Consider the layout of your shops and classrooms to help ensure students who may have orthopedic impairments can move freely around the room and into lab spaces. If they can't, consider setting up stations for all of your students so navigation and getting essential supplies is easier.
- Provide students with choice boards or let them select options on how they complete assignments which may help them connect with their interests or skills. For example, instead of saying the FFA Creed for a grade, allow some to write it, sign it, rap it, or illustrate it. This not only encourages creativity, but it lets students select something they enjoy or are especially good at. Student choice can also be incredibly beneficial for supporting emotional or behavioral needs and overall classroom management.

SAE Strategies for Inclusion

- During the first weeks of school, create time during the class period to talk with each student about their interests, current jobs, and career goals. Use this information to help them develop an SAE project that aligns with their needs.
- Utilize "SAE for All" resources to develop small scale SAE projects that can make a big impact for students with diverse needs. We need to rethink how we emphasize SAEs to allow students to take on different types of projects, even if they might not be the most complex. Not every student will compete for a proficiency award, but the value of a small-scale SAE project should be celebrated as well.
- Establish SAE requirements that meet the individual needs of a student and adhere to their Individualized Education Plan/Program (IEP).
- Work with your special education teachers to create an SAE experience that could count towards any required training hour requirements and possibly be incorporated into a career or skill portfolio.
- Utilize school-based SAE's to allow students to complete their SAE during school hours or help with various aspects of managing the agriculture program or facilities.

FFA Strategies for Inclusion

- Build rapport with students and understand their roles and responsibilities within their household. Understand that alternative times for training to fit the schedules of a wide variety of students may be needed.
- Allow students to participate in training for contests, even if they don't feel comfortable competing in the actual contest.
- Consider other contests that may be more appealing to students from a variety of backgrounds and abilities.
- As the agriculture teacher, emphasize the "experience" component and leadership components of teamwork that are developed through participation in events.
- Work with state FFA staff to help ensure resources are available for students who need support or accommodations when participating in FFA contests. Contact staff in advance to make them aware of needed modifications and accommodations.
- Identify student strengths and then explore areas where they can be successful in FFA events and activities.

Additional Ways to Find Support

- Work with parents from the beginning of the semester to encourage them to come help support students or work with students at home who may want to be more involved in FFA competitions and to help gain support for SAE projects.
- Build collaborative relationships with your special education department. These teachers can provide you with advice and guidance that will help you create

successful learning opportunities for your students with diverse needs.

- Teacher education departments can help by providing professional development training and specific coursework in teacher education programs on how to work with students with diverse needs in all aspects of the total program, not just in the classroom. This may involve a more holistic approach to teaching inclusion and making it a part of all courses and trainings, not just components of certain classes.
- Teacher education programs can also help provide coursework and professional development training on how to work with more severe disabilities within the total agricultural education program.

In reality, all of us have some sort of diverse need that impacts or has impacted our learning. However, it is the uniqueness of that need that makes us who we are as an individual, and all individuals should feel supported and valued in our agricultural education programs. As teachers, we must commit to answering "yes" to being inclusive of all students by utilizing strategies and establishing an inclusive environment within our classes, FFA chapters, and SAE programs. This can help to ensure that ALL students are provided with opportunities for experiential learning and leadership development.

In order for us to meet the needs of a world population that is expected to exceed 9 billion by 2050, we as agriculture teachers have a major challenge to promote agriculture and develop future leaders and agriculturalists. When we devote time to establishing relationships and building rapport with students, our programs will become inclusive communities and will help build confident citizens who recognize the value in others and promote inclusion in their future personal and professional lives.

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Lessons from Living on the Spectrum

by Amador Gonzales

There were signs that I was a little different than other kids growing up. To name a few, I was pretty non-verbal. I didn't consistently interact with other kids. I tended to line up toys from biggest to smallest. I could quote lines of dialogue from movies and television with ease, and more than anything, I loved to spin around for extended periods without getting dizzy. While I think these were fun, these weren't typical childhood behaviors, and my mother quickly took notice.

At the age of 5, my mother received news that would forever change the course of my life.

"Your son has Autism."

While growing up, I encountered difficulties due to my Autism. My social skills and ability to make connections with others were underdeveloped compared to my peers. Any time I had a conversation, eye contact was virtually non-existent except with those I knew very well. I had little "quirks" that were completely normal to me but apparently made me seem odd and disinterested to others, such as rocking my body when nervous, spitting out random facts at inopportune times, and staying to myself without a common friend group. If there were ever a routine change or an overload of my senses, I would essentially "meltdown" instead of throwing a tantrum, which made figuring out how to discipline me and address my needs extremely difficult.

What is Autism?

Autism Spectrum Disorder (ASD) is a condition that affects social skills and is characterized by repetitive behaviors, delayed speech, and nonverbal communications (Autism Speaks, 2022). One in 44 children is estimated to have autism in America (Centers for Disease Control and Prevention, 2021). It is extremely likely we will all have a student with ASD enter our classrooms at some point during our career. While signs of ASD typically appear between ages 2 and 3, or even as early as 18 months (Autism Speaks, 2022), this is a lifelong struggle that will be present throughout childhood, adolescence, and adulthood. We may see instances of ASD in mainstream media, such as in films like *Rain Man* and T*emple Grandin*, or in television shows like *The Good Doctor* and *Atypical*, but there is no one defined way to portray the characteristics and struggles that come with having ASD.

One of the biggest struggles educators might face is creating an inclusive classroom environment and making accommodations for students whose brain functions operate differently than their peers, otherwise known as neurodivergent (Resnick, 2021). Not every student with ASD will act exactly alike. Some may have stronger sensitivity to bright lights or loud sounds, some may have issues with public speaking, maintaining eye contact, or communicating with their peers, and others may have intense infatuations with specific topics and may not be able to focus on anything else. This variation of behaviors is why autism is portrayed on a spectrum; there is not one example of autistic or neurodivergent behavior.

How do we Navigate ASD in the Classroom?

Throughout my experiences as a student in agricultural education and as a future school-based agricultural education teacher, I have found some strategies that can help with teaching and mentoring students with ASD.

– **Chunk It** – When giving directions, break down information into smaller chunks that can be easily repeated back by the students. Most students with ASD like to receive validation

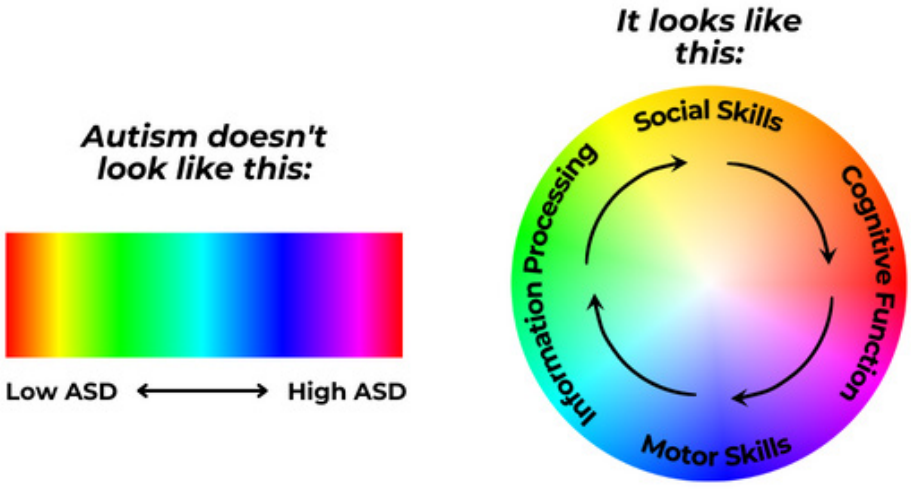
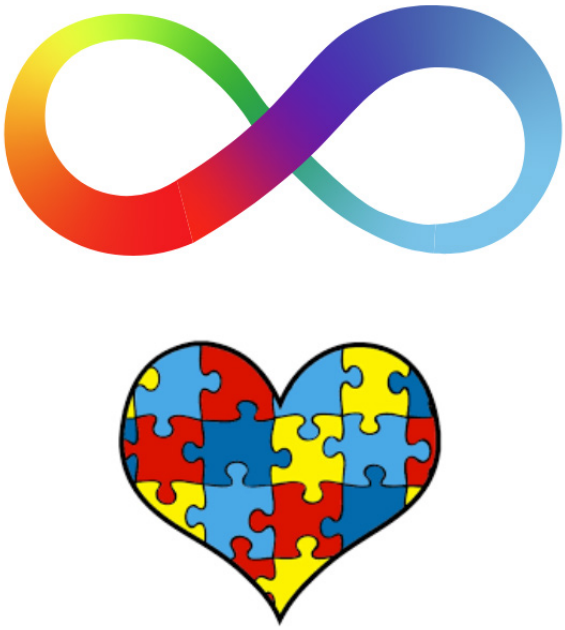


Figure 1. The reality of the autism spectrum.



(LEFT) The infinity symbol has symbolically replaced the traditional puzzle piece to represent autism awareness and neurodiversity, as the puzzle piece evokes thoughts of there being a missing piece or a puzzling quality to an individual with ASD (McPherson, 2022).
(RIGHT) Amador Gonzales presents his state officer retiring address in 2016, themed around his autism diagnosis.
Photo courtesy of the New Mexico FFA Association

in knowing they are doing things correctly, which typically means they will repeat things back to make sure they understand the expectations.

- **Find their Passions** – Typically, students with ASD develop an attachment to a specific topic or concept. Allow students to explore those passions with as much flexibility as possible and be creative in encouraging them to take part in the various areas school-based agricultural education has to offer, such as public speaking competitions, SAE projects, relevant CDE's, Agriscience Fair projects, and any other opportunity that arises. The list truly is endless when it comes to agriculture and agricultural education.
- **Structure, Structure, Structure** – Students with ASD strive for structure in their lives. If there is a specific routine or policy set up in your classroom, try to keep it consistent for the year. Changing something, such as the classroom layout, can create anxiety and stress in students with ASD. If you need to change anything, try doing it gradually and include your students in the conversation to be aware of the changes so they will not be surprised by them.
- **Know Their Identity** – One of the issues individuals with ASD face is how others identify their exceptionalities. ASD does not define what we are; instead, it is a part of who we are. Like a medical condition, we usually refer to someone as "having cancer," not "they are cancer." As we work with students with ASD, avoid referring to someone as "autistic" but instead as someone who "has autism." Doing this will help us be more inclusive of their exceptionalities and make them feel respected as individuals and not defined by a neurological disorder.
- **Avoid Sensory Overload** – There will be instances where the senses of a student with ASD are over-stimulated. Maybe the noise in a welding laboratory can be a bit overwhelming, the smell of animals or flowers might make them sick, or even the fluorescent lighting in the classroom can cause headaches or distractions, especially if there is a flickering bulb. Some of these things are out of our control, but the best thing we can do is allow these students the space to process what is happening around them and be flexible in allowing them to participate in classroom activities.
- **Follow the IEP** –A good IEP (Individual Education Plan) will be developed through consultations between parents, special education professionals, teachers, administrators, and the student. This will serve as a roadmap

to navigating how to include students with ASD in the classroom and help educators make the proper accommodations for them to succeed in an educational setting.

This is a small list of the potential strategies we can incorporate in the classroom. More strategies and resources are available through the Organization for Autism Research (2016).

Where Do We Go From Here?

There is no one way to work with a student with ASD. Some may have severe developmental issues that make it difficult to succeed in a traditional classroom setting. Others may not show any prominent signs of ASD when compared to their peers, prompting educators to question if they are on the spectrum. One thing to keep in mind is once students with ASD leave school, their diagnosis does not cease to exist. Programming and opportunities offered through a school-based agricultural education program can be beneficial, particularly in developing social skills and career success through working with animals, as described by Dr. Temple Grandin (Grandin, 2019). Having agricultural influences in the life of someone with ASD can also be therapeutic in the event of a meltdown and can help address sensory issues that they may encounter (Reeves, 2021).

One of the biggest questions from many of my friends and colleagues is, "How do you plan on telling your students you have ASD?" I've gone back and forth for a long time trying to figure out if I should disclose my disability or keep it private. As I start my teaching career, I have decided to embrace it and make it an integral part of my identity. Being involved in agricultural education did wonders for me, as it pushed me past my comfort zone and taught me new skills to be successful in an ever-evolving society. I think back to my mom teaching me to look at my ASD as not a disability but as being "differently-abled." It is because I do things differently that makes me who I am. I essentially have a superpower that allows me to analyze things from a unique perspective and complete tasks with ease, which will be beneficial as an educator and hopefully serve as an example and inspiration to students from similar backgrounds who enter my classroom. If we can help our students, especially those with ASD, recognize just how valuable they are and capable of doing incredible things, then the possibilities are limitless for their success.

I would not change anything about my ASD diagnosis. Because without it, I would not have enrolled in agricultural education or been led to a profession I am passionate about. My experiences helped me grow as an individual, and more than anything, I learned valuable lessons and look forward to my future in a profession I have so much love for. Even though my experience as a student with ASD in agricultural education is just one of many, the impact of an educator, particularly an agricultural educator, can make the most significant impact in creating an inclusive environment and allowing those who are neurodivergent to succeed and thrive, no matter the obstacles in front of them.

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Preparing All Learners for Postsecondary Success

by Javonne Mullins

Benefits of Agricultural Education for Students with Special Needs

Agricultural education programs have long been a popular academic choice for students with special needs. Currently, around 20 percent of students enrolled in middle and high school agriculture nationwide receive additional services for special education through an Individualized Education Plan (IEP) (Easterly & Myers, 2011). This is higher than the national average of around 14 percent of students in general education identified as having some form of disability. As far back as its inception, agricultural education has embodied the principles of hands-on, experiential learning, providing skills in a way that is accessible to all learners, including those with disabilities. Higher enrollment among students with special needs in secondary agriculture programs may be attributed to the inclusive nature of lessons and accessibility to pedagogy through hands-on instruction (Dougherty et al., 2018).

The three-circle model of agricultural education combines classroom and laboratory engagement, FFA involvement, and Supervised Agricultural Experience (SAE) to provide learners with education and skills necessary for postsecondary success at all levels. When carried out effectively, this three-circle model may have a profound impact on long-term outcomes for students with special needs. Students with special needs who are supported within a high-quality Career and Technical Education (CTE) program, such as agriculture, are more likely to graduate from high school, receive postsecondary training or education, and to gain employment (Conrad et al., 2020; Dougherty et al., 2018). Students with special needs who participate in CTE also receive higher wages than similar peers who did not participate in CTE (Advance CTE, 2020).

The FFA Mission states, "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education." How can we ensure this mission statement accommodates all learners, including those with special needs? Teachers from two distinctively different programs share their experiences and provide helpful tips to expand learning opportunities for students with special needs.

Program Spotlight: Monmouth County Vocational School District Horticulture Program

Kristina Guttadora is one of four horticulture teachers in a suburban program focusing on floriculture, greenhouse management, and landscaping at the Monmouth County Vocational School District (MCVSD) Career Center in Freehold, New Jersey. The MCVSD Career Center was established to provide career training solely for students with special needs, enabling many students to quickly gain access to careers following high school. Students with special needs from more than 30 school districts have access to this unique horticulture program or choose from one of nine other areas.

Students are recommended by special education case managers and guidance counselors from their home high schools. Students first participate in a five- to eight-day prevocational training program to determine skill levels and behavioral needs, and to help students discover specific interests. Once in the horticulture program, students split their daily attendance between their home high school and the career center. As students advance within the program, they are able to work within the horticulture industry outside of the classroom through Structured Learning Experiences.

Kristina works specifically with students in floriculture. She witnesses student growth firsthand in skill development and confidence through the hands-on opportunities gained in the classroom, greenhouse, work-based learning and the FFA. Kristina's top three take-aways for supporting students with special needs include: building confidence, differentiation, and collaboration.

Takeaway 1: Building student confidence

Building student confidence is important for students of all abilities especially when tasked with learning or demonstrating new skills where students might lack confidence. The Monmouth County Vocational FFA Chapter horticulture students have been successful in CDEs and other FFA events where they are required to showcase practical skills. Treating CDEs as a learning experience contributes to student success. She works diligently to create a pressure-free environment when students

begin preparing for an event. Students learn essential career development skills and prepare for CDEs through participation in school-based enterprises such as greenhouse plant sales, floral design, and school-grounds maintenance. These work-based learning opportunities promote success through applied skill development and boost student self-confidence.

The celebration of student success in CDEs and other events increases student confidence. Kristina and her co-teachers select events that are predominantly hands-on, enhancing students' specific strengths in technical skills rather than those with an emphasis on written exams. This year, CDE teams from the chapter placed first in Team Turf Management and second in the Floral Design CDE in the state of New Jersey. In addition to CDEs, students also regularly showcase their production and design work through events such as the statewide New Jersey FFA Horticulture Expo and Philadelphia Flower Show.

Takeaway 2: Differentiate and be flexible

The second approach Kristina uses is to be flexible and consider student abilities, progress, learning styles and preferences. Knowing student IEPs and differentiating lessons according to student needs is key. Providing students with multiple options when learning and practicing new skills, as well as during formative and summative assessments enables students to build on their interests and have a sense of autonomy in their education and skill development. When Kristina and her co-teachers provide time for practicing and developing skills, they often present their students with choices. Choices, for example, may include working in the greenhouse, arranging floral designs or creating flower gardens on school grounds. Students are also given the opportunity to work alone or in small groups for some of the projects.

Takeaway 3: Collaborate with other professionals

Kristina and her co-teachers often collaborate with special educators prior to annual IEP meetings by reporting on student progress, motivation, and behavior. Kristina recommends developing relationships with special educators and other service providers. In addition to assisting with feedback for IEPs, Kristina and her co-teachers regularly collaborate with Structured Learning Experience (SLE) Coordinators. SLE Coordinators work directly with students and potential off-campus work placement sites. Regular communication and planning between the agriculture teachers and SLE Coordinators is essential for students to obtain and be successful in school-to-work placements. This relationship is also critical for postsecondary transition planning to provide students with a plan after high school.

Lastly, Kristina emphasized the importance of establishing industry partnerships. It can be challenging to find businesses with prior experience hiring workers with special needs, or those that are willing to hire students for the first time. Industry partners are key for student employment upon completion of the high school program. Kristina also works to maintain relationships with Mercer County College, where the students can earn credit for the Plant Science program through an articulation agreement with the college.

Program Spotlight: Miami Trace High School Modified Co-Taught Agriculture

Wendi Mizer Stachler is an agriculture teacher in a comprehensive rural high school. She is one of three agriculture teachers at Miami Trace High School in Washington Court House, Ohio. In addition to teaching students with special needs through traditional agriculture courses, Wendi co-teaches a collaborative agriculture course with a special educator for students needing additional support with academics and life skills. Agriculture curriculum in this course is modified to meet the diverse needs of the learners. Pacing and delivery varies from the traditional Agriculture, Food, and Natural Resources (AFNR) course, yet broad concepts remain the same. The special education teacher serves as a co-instructor in the classroom, while paraprofessionals also provide one-on-one and small group support.

Wendi relies heavily on collaboration. She regularly plans for class with the special educator to ensure content is at the appropriate level for each learner, and so that timely concepts may carry over from other classes for added comprehension. In addition, Wendi communicates regularly with the other general education teachers who also work with the same group of students. This allows academic concepts and life skills to be taught and transferred across the various subject areas. Wendi utilizes peer mentors from other agriculture classes to work jointly on projects with students in her modified agriculture course. She thoughtfully pairs students to assist with activities where safety may be a concern, such as flower dissections where scalpels are used. Students from both classes develop positive relationships, increase communication skills, and grow in mutual respect for one another.

Wendi admits it does take time to become both knowledgeable and confident in working with students with special needs. Wendi's top advice to other educators includes: understanding student IEPs, incorporating concepts that cross curricula, and providing opportunities that will boost students' potential in their future workplace.

Takeaway 1: Know and understand students' rights through their IEP and 504 plans

Be proactive. Not all districts share information in the same way. Wendi suggests educators take time to meet with special education directors to ask questions about the IEP process and student rights in respective districts. She recommends becoming familiar with where to locate student skill levels, goals, accommodations and modifications and transitional goals within the IEP. Valuable information and insight can be obtained when an educator takes time to observe special education classes. Wendi checks in regularly with special education teachers to communicate student progress, provide feedback for IEP goals, and to get ideas for implementation of accommodations and modifications to remain compliant with each student's IEP.

Takeaway 2: Emphasize life skills and content that crosses academic areas

Wendi recommends tying in cross-curricular content and over-arching life skills wherever possible. This could include reinforcing current concepts from health or science class in agriculture or relating specific greenhouse skills to employability. Collaborate with teachers outside the agriculture program to help bridge academic and practical concepts. This will help solidify knowledge and transfer concepts for all learners.

Many students in the modified agriculture course partake in weekly work-based learning either on campus or in local businesses within the community. Wendi incorporates agricultural and employability skills in the classroom to better equip and support students in their placements. She emphasizes the importance of job interview skills, communication in the workplace, and general workplace etiquette and expectations.

Takeaway 3: Provide opportunities that will boost student potential in the workplace

Take advantage of industry credentialing, as these tools often provide evidence of the skills and training students have learned in a program. Search for credentialing that aligns with the agricultural program and student needs. Credentials are available in agricultural business, horticulture, mechanics, and many other areas. Credentials that require hands-on components are especially beneficial for students with special needs. Students entering the workforce with an industry-based credential in addition to the hands-on skills attained through the agriculture program will have a leg up on other candidates.

This year, students in many of Wendi's courses were able to take part in a virtual tractor driving program through The Ohio State University. By reaching out to a university partner, she was able to secure additional resources including virtual reality and an online safety course when preparing students for tractor safety certification through the National Safe Tractor and Machinery Operation Program. Students in the modified agriculture course also completed the tractor safety unit. While not all students were able to obtain certification, all were able to participate in the program to some degree based on individual abilities. Wendi credits the success of the modified agriculture course to the close and continued collaboration with other educators.

Looking forward to the future

Agriculture programs naturally provide students with opportunities for experiential and work-based learning that appeal to students of many learning styles and abilities. Students with special needs are attracted to, and often find success within these programs. All learners benefit when instruction is personalized, cross-curricular, and focused on individual growth. Strive to and encourage others to be flexible and creative in lesson design, pacing, activities and assessment. Reach out to peers, special educators, and other professionals to gain new ideas, garner support, and increase opportunities for all learners.

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Agricultural Education at the Alabama Institute for Deaf and Blind

by Cammie Grace Turner

The Alabama Institute for Deaf and Blind (AIDB) located in Talladega, Alabama, serves individuals of all ages who are deaf, blind, deaf-blind, and multi-disabled making it the world's most comprehensive education, rehabilitation and service program (About Us / homepage, 2022). There are six AIDB campuses in Talladega with ten regional centers located throughout the State of Alabama. Three of the Talladega residential campuses (Alabama School for the Deaf, Alabama School for the Blind, and Helen Keller School) are home to agricultural education programs and serve students kindergarten through twelfth grade. The AIDB is also extremely blessed to have the Joe Tom Armbrester Agricultural Center to serve their students.

The Alabama School for the Deaf (ASD) agricultural education program serves students in seventh through twelfth grades who are deaf or hard of hearing. While the school is considered a special education program due to the students' language needs, teachers follow Alabama state standards for agricultural education and teach the content in American Sign Language (ASL). Deafness does not affect the students' ability to learn, but requires teachers to use visual aids to develop understanding and connect agricultural concepts to the students' previous knowledge. Before working with power tools, the teacher and students review safety protocols and features of each tool. To be sure students understand proper usage of the tool the teacher models the function of the tool multiple times before allowing students to practice. Closer supervision is required at times due to not being able to verbally get the attention of students. The majority of lessons tend to be hands-on as it reinforces the concepts being taught better than lectures. Overall, teaching agriculture to students who are deaf/hard of hearing is similar to a conventional classroom with the exception of communicating through American Sign Language and adapting to reading levels.

> Deafness does not affect the students' ability to learn, but requires teachers to use visual aids to develop understanding and connect agricultural concepts to the students' previous knowledge.

Helen Keller School (HKS) serves students who are deaf, blind, or deaf-blind with an additional intellectual disability. Students may use wheelchairs, canes, walkers, or elbow crutches. Our goal is generalizations of skills in their home and community setting. We work with occupational therapists, physical therapists and orientation and mobility specialists to work on needed skills that are crucial to giving students more independence outside of the classroom in their homes and communities. While teaching about the agricultural benefits of using plasticulture, the contrast between the darker background and the plant is beneficial to students with visual impairments in locating and examining plants. Tasks that seem minimal to some students, such as moving hoses across a garden area, can be difficult and even dangerous for students at HKS because of the lack of color contrast. Through collaboration with therapists and specialists, the teacher is able to order equipment to make tasks easier and safer while still giving the students opportunities to care for plants.

The Alabama School for the Blind (ASB) agriscience education program serves students in grades eighth through twelfth who are visually impaired or blind. Many of our students also have other disabilities. Like HKS and ASD, we work closely with other specialists to ensure the needs of all our students are met. We follow the Alabama Course of Study standards for agriculture while providing the appropriate accommodations to our students to help them be successful. For students who are visually impaired or blind, we also follow the Expanded Core Curriculum to help our students learn skills for independent living, socialization, academic accessibility (braille and assistive technology), orientation and mobility, career readiness, self-advocacy, and sensory efficiency. In the agricultural education academic setting, these skills can be taught along with standards in a variety

(TOP) The gardens at the Joe Tom Armbrester Agricultural Center provide hands-on agricultural activities for AIDB students from Pre-K to 12 grade. (MIDDLE) AIDB Agriculture teacher, Cammie Turner works with students in the garden at the Joe Tom Armbrester Agricultural Center. (BOTTOM) AIDB students learn animal husbandry practices through caring for animals at the Joe Tom Armbrester Agricultural Center.
Photos courtesy of AIDB Joe Tom Armbrester Agricultural Center Facebook

of ways. For example, in the real world, a working agricultural setting can be very complex and change daily. Students at ASB learn how to safely orient themselves and travel in such an environment by utilizing self-protective techniques and cane skills. If one of their classmates left the hose pipe in the walkway, the tripping hazard is reduced if the student properly uses their cane to detect it before their feet reach its location. If a student has a chicken cage door open at face level, other students can avoid running into it by using a self-protective technique where they keep their hand raised in front of their face to detect hazards before they fully encounter them.

ASB students also learn how to use different assistive devices to work in the agriscience classroom such as talking scales to weigh vegetables, liquid level meters that beep when a cup or waterer is full, braille or large print rulers and tape-measures, magnification devices, digital color indicators, text-to-speech software on their digital devices, etc. Through the use of the assistive devices, students learn many skills that will help them be more independent and prepare them for life beyond high school. Another great benefit of the agriscience program at ASB are the hands-on experiences students may not have anywhere else. Students at ASB learn how to improve their

sensory efficiency, the ability to use their functional senses to complete tasks, by learning how to care for poultry, plants/gardens, fish/frog aquariums, and the classroom rabbit. They also learn how to use their senses to complete carpentry tasks such as using a saw, sander, or drill/impact and develop self-advocacy by expressing their needs or by asking for assistance if needed. Like at ASD, the teacher carefully instructs students on safety and models correct procedures before allowing them to complete a task, especially one involving power tools or chemicals. Students who are blind require more one-on-one descriptive instruction and assistance when completing hazardous tasks. Last but not least, the program introduces them to many new career paths they may have thought were out of reach for them or that they may have never heard of. If they are not interested in an agriscience related career, they learn where their food comes from and the work involved with producing it, can develop an appreciation for agriculture, and have experiences that will stay with them forever.

While each teacher has their own classroom and garden space on their campuses, AIDB is fortunate to have the Joe Tom Armbrester (JTA) Agricultural Center on their property in Talladega. The facility was made possible by an anonymous donor and endowment in memory of Joe Tom Armbrester. Armbrester was an avid farmer in the area who cared for and wanted to do something for the children at AIDB. In 2017 after the major donation, land was cleared and an accessible barn was built. Students from all AIDB campuses use the facilities. The barn is large enough to accommodate a school bus if needed for inclement weather and includes a classroom and fully operational kitchen. Having the classroom and kitchen in walking distance from the raised beds and garden area allows students to harvest fruits and vegetables in the garden and then wash and cook their harvest using the kitchen. The JTA Agricultural Center allows teachers to teach agriculture concepts alongside essential life skills. Students learn to operate equipment ranging from battery powered push mowers and weed trimmers to industrial tractors with GPS and multiple implements. Animal care is also part of the operations at the JTA Agricultural Center including work with current animal residents (cattle, chickens, and sheep). The students are responsible for basic care by ensuring there is ample feed and water for the animals. The agriculture teachers also utilize the facility to further their classroom instruction with multiple opportunities for hands-on learning.

To learn more about the Alabama Institute for Deaf and Blind (AIDB) Joe Tom Armbrester Agricultural Center:

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Cammie Grace Turner is starting her second year as the Agricultural Science teacher at Alabama Institute for the Deaf and Blind – Alabama School for the Deaf. She obtained her Bachelor of Science in Agricultural Communications from Auburn University in 2018 and master of science in Agricultural Education and Leadership from Oklahoma State University in 2020. Currently, she is working on her master of arts in teaching in special education/deaf and hard of hearing education.

From Thesis to Classroom: The Impact You Can Make When Teaching Students with Exceptionalities

by Raegan Ramage

Each student who passes through our classroom door is unique in their own way; each possessing their own home environment, experiences, and learning needs. As school-based agricultural education (SBAE) instructors, we can easily recall memories teaching students who have unique needs. Similarly, we are also able to recall the challenges experienced when meeting these students' needs. A challenge at the forefront, both historically and presently, is meeting the needs of students with exceptionalities. Research indicates the answer to effectively serving students with exceptionalities is not found in one professional development session, one collegiate course, or one paraprofessional attending class sessions. Although each of these resources are helpful, they often leave lingering questions as we work to serve students with exceptionalities. I hope to provide some clarity to how educational approaches may look to effectively serve students with exceptionalities from the perspective of the three-circle model of agricultural education.

In the classroom, the number of students with exceptionalities has continued to increase each year, reaching the highest percentage to date during the 2018-2019 school year, with 14% of students having a documented exceptionality. Agricultural education classrooms are recognized for benefiting students with exceptionalities through the hands-on nature of the curriculum. Consequently, this perceived benefit has led to higher average enrollment numbers of students with exceptionalities, when compared to other courses. Despite the benefits for students, these higher enrollments often cause SBAE instructors to refer to our classrooms as "dumping grounds" for students with exceptionalities.

As a first-year teacher, I found myself confronted with this notion as I peered at a roster of 22 students, 17 of whom had an IEP, 504, or behavior management plan. The stories I read throughout my thesis research had become a real-life scenario. I was experiencing the overwhelming feeling I previously heard from others in the profession. I transitioned my perspectives from one of nervousness to a mentality of motivation, knowing my classroom had the ability to serve students with exceptionalities by utilizing approaches not often available to those in traditional classrooms.

When we look at the benefits of an agricultural education classroom, hands-on learning applications quickly rise to the top. In these applied learning situations, students with exceptionalities showcase their abilities that sometimes far outweigh their peers. I found that through the incorporation of hands-on activities, ranging in complexity from rigorous shop projects to as simple as using Play-Doh to mold figures to represent concepts, the academic curtain that had covered students with exceptionalities was finally able to lift. Additionally, frequent *brain breaks*, consisting of cutting out notes and gluing them into students' interactive notebooks, presented the benefit of maintaining a student's attention span.

Although I have reflected research findings in relation to my own experiences, the most impactful method I have noticed when serving students with exceptionalities is to always speak directly to the student. We, as educators, must allow the student to speak for themselves, or in some cases help the student develop their own voice, whether in an IEP meeting, discussing accommodation or modification implementation. As students learned to express their needs and advocate for themselves, I found the process of developing and implementing the students' learning needs was greatly expedited. Furthermore, as you implement hands-on learning activities and communication with your students, I encourage you to reach out to faculty and staff who may serve as resources at your school, such as special education coaches, teachers, or paraprofessionals.

Research has indicated positive outcomes associated with students with exceptionalities' involvement in FFA, including impacts on students' self-identity, employability, and leadership development. Involvement for students with exceptionalities in the National FFA Organization can range from chapter meetings to traveling to and competing in events at the National FFA Con-

> As advisors, we must understand and validate the needs, accommodations, and modifications for our students to ensure we can adequately support their pursuit of equitable outcomes.

vention. Some activities, especially those that require travel, may be potentially intimidating due to the increased logistical planning to meet student needs. Specifically, SBAE instructors have shared increased concerns for students with exceptionalities at CDE and LDE competitions especially when the fast-paced environment of an event may cause a student to feel over-stimulated. Additional support typically provided to students with exceptionalities in the academic setting is not necessarily built into every CDE or LDE competition. While accommodations and modifications may be requested, a greater need remains for approaches to ensure effective implementation. SBAE teachers shared positive experiences training and coaching students with exceptionalities for CDE and LDE events and admitted these students are similar to their peers in their desire to build confidence. An interest in discovering and implementing methods of training students with exceptionalities to compete alongside their peers could also provide richer experiences for all students.

However, through the lack of FFA opportunity allocation for students with exceptionalities, one critical question arises: *How are we serving all students if we do not encourage the participation of students with exceptionalities?* When forming a solution to this complex question our profession must increase our self-efficacy in working with students with exceptionalities. As SBAE instructor self-efficacy increases, students with exceptionalities' positive experiences in FFA may also increase.

An increased level of positive FFA experiences does not end at the chapter level, but must continue at the state and national levels. For example, stories of students with exceptionalities not being appropriately served at the National level are not new. In my own research, an SBAE instructor shared her experience traveling to the National FFA Convention for a student with orthopedic exceptionalities to receive an American FFA Degree. Despite the advisor's request in advance for accommodations allowing this student to sit on the floor alongside her

peers, the students' needs were not met, and she was ultimately unable to sit alongside other recipients. How can we ensure these occurrences do not continue? As advisors, we must understand and validate the needs, accommodations, and modifications for our students to ensure we can adequately support their pursuit of equitable outcomes.

Supervised Agricultural Experiences (SAE) allow all students to demonstrate applied learning through experiences outside the classroom. Research has described how SBAE teachers believed SAE projects help students with exceptionalities advance their career goals and social skills. When assisting students in your classroom in the development of their own SAE project, ensure the project they select upholds their passion. Additionally, SAE projects must be diverse to meet each student's goals. For example, one of the most impactful experiences I witnessed occurred at the Agriscience Fair at our most recent Louisiana State FFA Convention. As I walked my own students to a session, I saw a group of FFA members presenting their projects to a panel of judges. I noticed a student with an orthopedic exceptionality and his partner presenting their work in which they explored SBAE teachers' perceptions of teaching students with orthopedic impairments. After viewing this presentation, I reflected on the impactful opportunities for our members to utilize their passions, and, most importantly, their voices in their SAE projects.

My experience viewing those students' SAE projects is one that will stay with me, and when I reflect on how I am serving students in my own chapter, I've reached a new level of clarity. First, when assisting students with exceptionalities in developing SAE projects, it is vital to not place limitations on the student. As an educator, I should encourage my students with any exceptionality the same as any other student through their implementation of a livestock management SAE project. Furthermore, the project should look into the impact longevity for the student; not all milestones can be reached in one school year for a student, but instead may move mountains by the conclusion of their high school careers. Research states the success of a student's SAE project is directly impacted by the support, frequency of help, and encouragement of the SBAE instructor. I encourage you to understand the value you bring to students' project success.

Much work remains to be done in meeting the growing demands of serving all students in each sector of the agricultural education model. In the coming years, we should see increased research to identify SBAE instructors' needs when teaching students with exceptionalities, application of professional development centered on specific disability types, and accommodation strategies. As SBAE instructors, we are consistently in a position of meeting needs with limited solutions and resources. However, when you look at your class roster with a large proportion of students with exceptionalities or receive information from your school's special education department about which accommodations you have to implement, I encourage you to take a moment to reflect. In that moment, think of the greater impact your course can serve for students with exceptionalities they may not receive in other mainstream courses. Our agricultural education courses are an opportunity for students with exceptionalities to gain employability skills, confidence, and increased personal and professional opportunities. As students with exceptionalities make an impact on our lives as SBAE instructors, I further encourage you to reflect on the long-term impact your class will make on their lives.

Raegan Ramage completed her Master of Science in Agricultural and Extension Education degree from Louisiana State University, where she completed her thesis, The Perceived Importance and Ability of Secondary Agricultural Education Teachers Regarding Accommodating Students with Exceptionalities: A Mixed Methods Study. Prior to completing her degree at Louisiana State University, she completed her Bachelor's Degree at Mississippi State University. She is entering her second year of teaching agricultural education at Springfield High School, in Springfield, LA, where she will be teaching Agriscience and carpentry courses.

The Warrior Goat Program

by Dr. Kathryn Teixeira & Kiera Van Patten

What started as a simple question has become a movement among the livestock showing community, leaving an impact beyond expectation.

The Warrior Goat Program is an extracurricular, non-profit association comprised of disabled and non-disabled high school students, working together to raise an animal for their local county fair. The program started in 2014 by a Righetti High School student, Kiera Van Patten, with the help of her father Dutch, has grown into a major highlight of the Santa Barbara County Fair on California's Central Coast.

Humble Beginnings

Kiera and her family were active volunteers with the Special Olympics. One year while showing her market goat at the Santa Barbara County Fair, Kiera looked around and asked, "What do those with disabilities do if they don't like to play sports?" As a kid, Keira played sports, but never really loved anything as much as showing livestock, thus her mission began to make her passion a more inclusive place. She talked to her dad and realized while there was a disconnect between the disabled community and the livestock industry, there was also an opportunity to make something happen.

In its first year, the Warrior Goat Program (named after the Ernest Righetti High School Warrior mascot) served 6 special education students and 12 general education high school students. Since 2014, the program has grown to serve all three high schools in the Santa Maria Joint Union High School District and has expanded to schools in California, Wyoming, Texas and Arizona. Although the program experimented with market lambs at one point, market goats have been the only animal that is consistently shown with the Warrior Goat Program because the temperament and size of meat goats works best for the students in the program.

The Warrior Goat Program is funded and continues to grow through both community support and self-sustaining measures. Community members and businesses are an integral part of the program, providing sponsorships for individual students that cover costs associated with the project, including the students' Grange and FFA show uniforms. In addition, the program works with local livestock producers who donate livestock for the program, which is usually the greatest cost for the student. With essentially no expense to the students, except time invested, students can focus on their project and engage in the program without worrying about the high cost often associated with raising livestock. In return, students enrolled in the program donate part of their County Fair livestock auction earnings to continue to provide the program at no cost to future students.

(LEFT) The Warrior Goat Program group.
(RIGHT) The Warrior Goat Project recently opened it's program to younger members with the establishment of the Warrior Goat Grange.

How are student partnerships chosen?

An essential aspect to the success of the Warrior Goat Program is the partnership with student mentors. Early on in the program, there were fewer students involved and it was much simpler to know which students would work best with each other. Over time, and as the program grew, new systems were added and modified to account for the increase in participation. Today, students complete an application for the program and a committee works to establish the best possible pairing for both the disabled and non-disabled students' needs.

Mentors are trained at the beginning of every show season. We have returners in the mentor group year to year to help with the process of training the newcomers. These students are volunteers from local FFA, Grange, and 4-H. As the program has grown and there has been more need, we have expanded to a wider age group.

Lessons Learned from the Warrior Goat Program

Keira says the memories, friendships, and lessons learned from working with the Warrior Goat Program stick with her even today. Her biggest takeaways are:

1. Limits are not defined by a diagnosis.
2. Some people may need a little bit more help or modifications, but that doesn't mean they can't participate.
3. Treating people with kindness can go a long way.
4. Hard work and hot weather are a lot more bearable with good friends around.

(LEFT) Founder, Kiera Van Patten (far left), works with her partner in the show ring during the Santa Barbara County Fair.
(RIGHT) Current Student Leader Kayce Van Horn helps her Warrior Goat Team mate at the 2021 Memorial Show.

The Future of the Warrior Goat Program

In 2020, when COVID-19 limited opportunities for students to show livestock in Santa Barbara County, the Warrior Goat Program and its supporters created the Anna Northrop Memorial Goat Show as an opportunity for its students along with other local livestock exhibitors to showcase their projects. The Anna Northrop Memorial Goat Show just celebrated its third year, and continues to grow through the support of the community.

The program has evolved in the past eight years. Keira moved to Idaho to attend college, and continues to support the program while her father remains an integral part of the program. Today, the Warrior Goat Program is led by student volunteer Kayce Van Horn. Kayce, who has been involved with the program since it began and always had a vision for the program, is now putting her vision into motion and the Van Pattens are excited to see where she takes the program in the future.

Dr. Kathryn (Katy) Teixeira is an Assistant Professor in Agricultural and Environmental Education at University of California, Davis.

Warrior Goat Program founder, Kiera Van Patten, graduated from Boise State in 2021 with a degree in Civil Engineering and works in land development in Boise.

The Warrior Goat Program: The Advisor's Perspective

by Kylin Bray

Why is the program important?

The Warrior Goat Program provides an opportunity for special education students who might not otherwise have been able to show an animal at the fair. The goat, feed, and supplies are all donated after they are selected as an exhibitor for the year. The special education exhibitors are paired with mentors who teach them and provide them the support they need to be comfortable raising and showing their goat. For example, this year we have a blind student showing with us. Her mentor is there to help guide her through the show ring and set her goat up but she does the showing part herself. The relationships the students create with each other are invaluable!

Watching the students work together towards a common goal is unbelievably special. Not only do they work together, but they become great friends and they come back to the program even after they are done exhibiting. The Warrior Goat Program is also a family affair. We have one exhibitor with Down syndrome whose older brother (also with Down syndrome) was an exhibitor with us. He is now an adult and helps mentor students in the program. During the fair, students spend time together laughing and making memories- something they may not have done if it weren't for the Warrior Goat Program.

What are some of the joys and discomforts of the program?

The list of "joys" is very long. Witnessing the success of the special education students when their hard work pays off in the show ring is incredible. It's always exciting to see them place in their market class and then turn around and also be competitive and place in a showmanship class. It is absolutely heartwarming to hear the applause and support of our Warrior Goat Program students from other exhibitors in the ring and the people watching. A parent of one of our students said after last year's Memorial Goat Show (we didn't have a fair in 2021) that the program helped her daughter feel like she was a part of something! The parent also shared with me how she noticed her daughter talked with the mentors more than she had ever talked to anyone her age before. Discomforts—Well, animals, after all, are animals and sometimes things don't work out or animals don't cooperate which can frustrate the students.

How do you as an advisor work with the students?

As a co-advisor, my job is to supervise and guide the students when necessary. The student leader is in charge of the day-to-day operations. They work with the students to determine the current feeding requirements for the livestock. The student leader also leads showmanship practice where the students learn how to work with and present their goat.

The exhibitors meet every afternoon with their student mentor to work with their animals. Mentors are trained at the beginning of every show season and we often have returners in the mentor group who help with the process of training the newcomers. As the program has grown and there has been more need, we have expanded to a wider age group, and have student mentors from local FFA, Grange, and 4-H.

To learn more about the Warrior Goat Program, visit:

Kylin Bray is an Agriculture Teacher at Pioneer Valley High School in Santa Maria, California. This will be her 6th year teaching in the Santa Maria Joint Union High School District.

Hands-On Project-Based Learning in Aquaponics Builds Students' Confidence in STEM

by Kenneth R. Thompson, Chelsea T. Walling, Janelle V. Hager, Kirk W. Pomper, & James H. Tidwell

Hands-on projects in the classroom can make complex science, technology engineering and mathematics (STEM) concepts more tangible for students. By allowing students to use problem-solving and engineering skills, they can enhance their comprehension through real-world connections. Aquaponics, the combination of aquaculture (fish production) and hydroponics (soil-less plant culture) can be implemented as an educational tool to understand abstract STEM concepts like the nitrogen cycle, carrying capacity, system design, and others. It can also be used to encourage project ownership, teamwork, and self-confidence. At Kentucky State University's (KSU's) Aquaculture Research Center (ARC) in Frankfort, Kentucky, a three-month aquaponics project-based learning program was implemented to assess students' perceptions, attitudes, and behaviors towards STEM careers. Two students of different ages, educational backgrounds, and out-of-school experiences were observed while constructing small aquaponics systems.

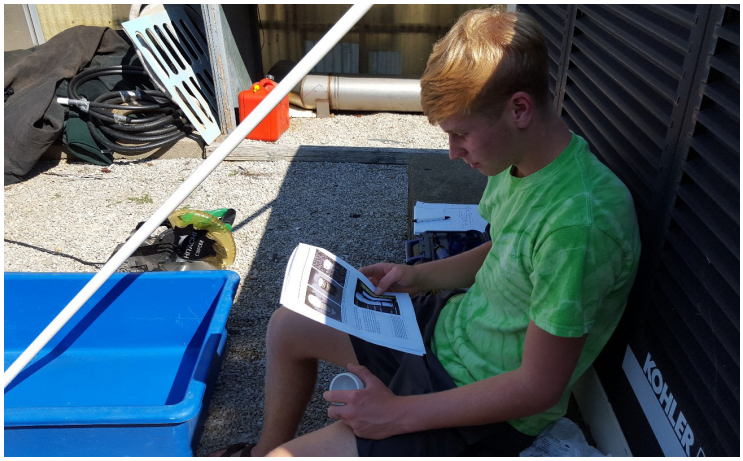
The program had one KSU undergraduate minority student who majored in Agriculture, Food, and Environment (AFE) and one high school senior who attended a local independent public school. Both students were engaged in the construction of a backyard aquaponics system (i.e., constructivist learning environment). Under supervision of KSU aquaculture scientists, student participants designed and constructed their system, built a self-regulating flow valve (automatic bell siphon), worked to troubleshoot their system, and made sure it was working properly. The program occurred during the months of October through December when the students were not in their traditional classroom setting (i.e., out-of-school/class experience). Both students worked at the ARC three to four days per week and stayed for a minimum of two hours each day.

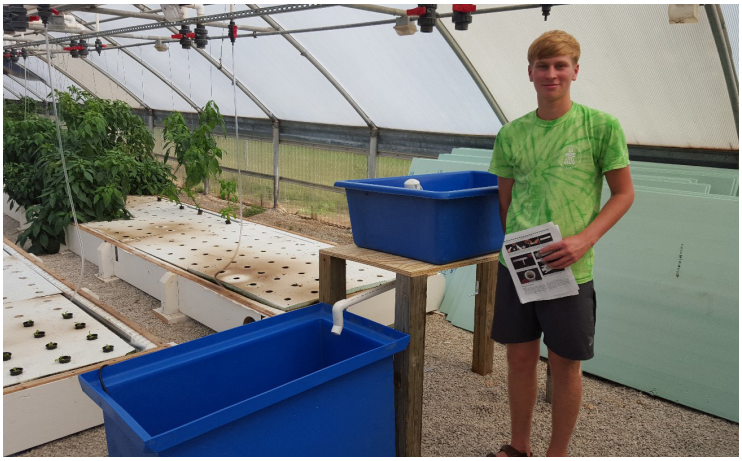
What did they do?

The demonstration greenhouse had operational systems the students could use as a visual reference. Both students were provided a published factsheet entitled "Construction of Automatic Bell Siphons for Backyard Aquaponics System" (Fox et al., 2010) to read prior to assembly. This paper described in detail how to construct, size, and troubleshoot an automatic bell siphon for use in a small-scale backyard aquaponics system. The report provided the main concepts of integrating aquaculture and hydroponics, where fish wastewater is utilized as a nutrient source for plants to grow in a soilless environment. The system type used in this project was flood-and-drain aquaponics system. The basic system design has a fish grow tank with an electric pump that moves nutrient-dense fish effluent water to the plant bed that contains expanded clay pellet growing media. Plants use nitrogen and other nutrients from the water for growth allowing the 'clean' water to return to the fish through a bell siphon drain.

A number of positive outcomes were noted throughout the design, construction, and operation of the students' systems:

1. **Students were able to contribute their own experience and perspectives to the project.** The college student seemed to take charge and operated the power tools, while the high school student would help measure and provide feedback based on the written fact sheet. The high school student constructed the bell siphon with the assistance of an aquaponics expert.
2. **Students developed critical thinking skills.** To construct the bell siphon, they had to read written instructions and then replicate it in real-time.
3. **Students gained a sense of pride and self-satisfaction.** Students had a sense of excitement, self-confidence, and joy when the system they built worked as expected.
4. **Students showed focus and determination to engage in the project.** Students took ownership of their learning.
5. **Students were motivated to engage in the project from start to finish.** Students showed a positive attitude and had fun doing this hands-on aquaponics activity.





(TOP LEFT) Technical reading skills were crucial for students to interpret and follow the correct steps while building the aquaponic system.
(TOP RIGHT) The completed aquaponic system was ready to be tested after successfully following directions during the construction process.
(BOTTOM LEFT) Students developed their teamwork and communication skills while constructing the aquaponic system.
(BOTTOM RIGHT) Troubleshooting was necessary throughout the process to identify problems and discuss steps to solve them.

What did the students say?

One provided a number of examples of how this project fueled his interest in pursuing a career in STEM. He believed that this project was beneficial for him to:

1. Gain certain life or occupational skills (working with PVC and power tools);
2. Improve his ability to follow systematic directions;
3. Challenge his critical thinking decision-making, and problem-solving skills; and
4. Become more responsible and mature through life encounters both inside and outside the classroom.

Interestingly, he also commented that his high school did not currently have a FFA chapter and he hoped to begin one and utilize the system for future educational purposes. Overall, the high school student stated that the experience affected his interest and motivation to learn more about ag-STEM fields of study and careers. Based upon the responses of the high school student, hands-on, project-based ag-STEM activities lead to positive outcomes as it relates to self-confidence, motivation, decision-making and problem-solving skills, focus, and responsibility.

We more recently reached out to the high school participant and he was happy to provide us with an update on his current career path.

"Reflecting back on my internship experience with Kentucky State University's Aquaculture program, there are many lessons that I learned that equipped me for my future in STEM and my career in the agriculture field in general. First off, I believe my project of building the backyard aquaponics system gave me the confidence to explore subsistence agriculture more seriously and approach growing food in a more sustain-

able way. From constructing the actual system to learning its growing potential, I found that I could harness my skills and create food for not only myself but also that aquaponics could be used as a means to inspire future students. With that realization, I donated my aquaponics system to Frankfort High School in hopes that future generations could take part in keeping the sustainable system going. After my internship, I was inspired to complete a Bachelor's of Science degree in agriculture and natural resources. During my undergrad, I took part in many research projects in the agriculture, sustainable and environmental studies realm and with every single project, I was able to channel the teamwork, problem solving, and creative thinking skills that I experienced during my internship with KSU. After completing my degree, I have since been able to use my expertise to work in the sustainable agriculture industry and am currently an apprentice homesteader and eco builder in eastern Kentucky. Overall, I am very thankful for my experience and can confidently say that it paved the way for me to explore a life of sustainability and subsistence agriculture."

Final Takeaways

Overall, this project shows how hands-on, project-based STEM learning activities in aquaculture/aquaponics can produce positive learning outcomes. These opportunities can be implemented with traditional teaching strategies in efforts to deepen student's knowledge and create enduring experiences that may last a lifetime. Students said that real-life, applied activities increased their aspirations, motivation, and interest to learn more about STEM and related career paths. Project-based learning environments provided an opportunity for students to obtain problem solving and decision-making skills that extend beyond the classroom. This valuable teaching tool allows students to take ownership of a project, boost self-confidence, gain practical life skills, and learn how to work well with others. Our findings demonstrate that aquaculture has the potential to address important real-world workplace skills, promote youth development, and can reach a diverse group of students with different educational backgrounds, age, as well as out-of-school experiences.

Acknowledgements

We thank Mr. Charles Weibel for taking and editing the photos as well as assisting with video recording of the students constructing their aquaponics system.

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Dr. Kenneth R. Thompson is a State Specialist for 4-H STEM/Youth Development in the College of Agriculture, Community, and the Sciences at Kentucky State University. He serves as the main contact for secondary schools throughout the Commonwealth of Kentucky that involve aquaculture education in the classroom.

Mrs. Chelsea Walling is an Extension and Research Associate – Aquaculture at Kentucky State University.

Mrs. Janelle Hager is a State Specialist Aquaponics at Kentucky State University

Dr. James Tidwell is a Professor and Chair of Division of Aquaculture at Kentucky State University.

Dr. Kirk Pomper is a Dean and Professor of the College of Agriculture, Community, and the Sciences at Kentucky State University.

Bristol County Agricultural High School Begins Using State-of-the-Art Milking Robot at New Dairy Barn

by Matthew Reid

As part of a major expansion project and upgrade on its campus, Bristol County Agricultural High School in Dighton has installed a new state-of-the-art milking robot in its new dairy barn. The new first-of-its-kind technology was announced by the Massachusetts Association of Vocational Administrators (MAVA) and Kevin Braga, the school's Acting Superintendent/Principal.

Last month Bristol Aggie began utilizing a new milking system at its recently-opened dairy barn on campus. The centerpiece of the new barn, a fully-automated robotic milking machine, allows for cows to be milked 24 hours a day in a controlled environment. Prior to last month Bristol Aggie staff would start at 5 a.m. daily and milk cows on a twice-a-day schedule.

Once a cow makes its way into the machine room, the milker will drop down grain for the cow to feed while it is being milked. The robotic arm will safely milk the cow and a recording of the process will be made for staff to view either in real-time or at a later date.

The cows were moved into the new barn at the end of June, and for the first week they were only in the space for a few hours a day. The following week they spent time in the barn overnight, and started milking with the new machine on June 23. Staff members and cows have been getting comfortable with the new space since then.

Students assisted moving the cows in and out of the barn during the first week. As it was right at the end of the school year they have not been able to fully utilize the space, but the school is already looking forward to having the students benefit from the barn starting with the next school year.

"Our students are involved in the care and maintenance of our animals every day, so this barn will be a tremendous resource to have and a great hands-on learning opportunity," Bristol Aggie Animal Science Department Chairperson Leslie Blanchette said. "Right now we are all still learning and getting adjusted. The cows' behavior will dictate how the barn is fully utilized, as the health and well-being of our animals is of the utmost importance. We look forward to being more comfortable with the space by the time school starts up again in the fall."

Bristol-Aggie is currently the only high school in the state (and

(LEFT) Bristol County Agricultural High School's new dairy barn features several technological advancements for its 20-plus milking cows.
(RIGHT) Cows enjoy the feeding area at Bristol County Agricultural High School's new dairy barn.
Photos courtesy Bristol County Agricultural High School

as far as staff believes, the country) to utilize a fully-automatic robotic milker, which is specifically a DeLaval-brand voluntary milking system (VMS). Some colleges, including the University of Connecticut, use such a system as well.

"This is a very exciting time for our school, as we are now ahead of the curve using such cutting-edge technology like this," Acting Superintendent Braga said. "Our students and staff have always done such amazing work with so little, and with these upgrades the sky is really the limit once they are given tools like this."

Bristol Aggie consulted with Mark Duffy, the school's Agri-Mark cooperative representative, for more than two years during the planning of the new facility. The overall expansion project was funded in part through a grant from the Massachusetts School Building Authority.

A State-of-the-Art Space

The school's new dairy barn is part of a larger 196,000 square-foot campus expansion and renovation project that officially concluded this spring. The project also included the addition of a new Student Commons, Center for Science and the Environment (CSE) and renovations to Gilbert Hall and the agricultural mechanics building.

Each cow in the barn is equipped with an identification tag that is read as the cow comes through the gate to be milked, which will monitor feeding times. Cows are also given biometric collars that can track their movement as well as health measurements. The machine itself has a high-resolution camera that can provide data to staff members through a mobile app as the milking occurs.

"Not only is the milking machine fully automated, but we receive all of this data in real-time

(TOP LEFT) The front view of Bristol Aggie's new dairy barn.
(TOP RIGHT) Bristol County Agricultural High School's new dairy barn has capacity for more than 20 milking cows.
(BOTTOM LEFT) A cow enjoys a comfort brusher in the dairy barn.
(BOTTOM RIGHT) Last month Bristol Aggie began utilizing a new milking system at its recently-opened dairy barn on campus. The centerpiece of the new barn, a fully-automated robotic milking machine, allows for cows to be milked 24 hours a day in a controlled environment.
Photos courtesy Bristol County Agricultural High School

as well," Animal Science instructor Caitlin Bosworth said. "This is not only highly beneficial to us and for the health and safety of the cows, but it will provide tremendous educational advantages to our students. The barn and all of its features will give students the opportunity to see the real operation of a full working dairy barn, with the added benefit of it being totally state-of-the-art."

In addition to the separate automated milking area, the new barn allows the approximately 25 milking cows 24/7 access to food and water as well as comfort areas where they can lie down and relax. Extra tall ceilings provide increased ventilation, and air exchange fans prevent flies and regulate temperature.

The barn is also equipped with self-operating tools that operate multiple times a day to keep the space clean for the animals. There is a separate viewing area by the milking station so staff and technicians can view the milking in real-time.

The school is looking forward to allowing all students -- not only those in the Animal Science program -- to benefit from the barn and its numerous technological advancements.

"This type of facility is great for drawing attention to our school and recruiting incoming students, and also being a tool available for students from programs such as robotics, environmental engineering, and more," Blanchette said. "It is something our entire school community will greatly benefit from."

While dairy farming might not be a major industry in Massachusetts, the ability to provide such a high level of real-world, hands-on education with state-of-the-art technology is something that will position Bristol Aggie students to get jobs in major farming communities across the country, from New York and Vermont to Wisconsin.

To learn more about the Animal Science program at Bristol County Agricultural High School:

To learn more about the Massachusetts Association of Vocational Administrators:

MAVA, the professional association that represents the interests of agricultural and vocational-technical high schools throughout Massachusetts (of which Bristol County Agricultural is a member), celebrates the school's technological and education advancements.

"We applaud Bristol Aggie for its forward-thinking approach to its new dairy barn," said MAVA President and Smith Vocational and Agricultural High School Superintendent Dr. Andrew Linkenhoker. "We have seen time and time again vocational and technical schools leading the way in Massachusetts in terms of giving students access to the tools needed to immediately succeed in the workplace. We look forward to seeing Bristol Aggie students getting to use this new space and enjoy all of the educational advantages it provides."

Matthew Reid represents the Massachusetts Association of Vocational Administrators (MAVA), helping to promote the interests of vocational-technical educators from public high schools throughout the Commonwealth of Massachusetts. He also represents more than two-dozen non-vocational public schools through his work with John Guilfoil Public Relations.

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