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Assessing Student Achievement

Moving Forward by Looking Back

by Harry N. Boone, Jr.

The September-October issue of the *Agricultural Education Magazine* introduces the themes for the upcoming year. As I contemplate my sixth and final year as Editor of the *Magazine*, I have developed an idea for the final three issues. Before I introduce the idea, allow me to provide a little bit of my philosophy.

Today we are standing on the shoulders of the giants of the profession. The accomplishments that we make today are made possible by the efforts of past leaders in the profession. The names of many of these individuals would be readily recognized. There are many individuals, however, that have made significant contributions to the profession that the average individual would not recognize.

Too often we associate the concept of national leaders in the profession with college professors. While I do not want to discount the role that college professors in agricultural education have made on the profession, the contributions of high school teachers and state supervisors are just as significant. Let me give you two examples.

Virgil Wilkins taught for fifty-one years at Hundred High School in West Virginia (see the cover of the July-August 2013 issue of the *Agricultural Education Magazine*). While he was not known for publishing journal articles or conducting research, he made a significant contribution to the profession through his quality teaching, participation in the professional associations, and the development of knowledgeable, capable individuals that entered and were successful in

the agriculture profession. Think of the wisdom that he could share with the younger (and more seasoned) members of the profession.

Example number two is an individual whose career spanned nearly forty years as a State Supervisor of agricultural education in west Virginia. Once again Donald Michael is not known for publishing journal articles or conducting research, however, think of the knowledge that he could share on the development and funding of high school agricultural education programs. Think of the milestones that he has witnessed over his professional career.

I plan to devote the last three issues of the 2015 *Agricultural Education Magazine* to leaders/former leaders' reflections on the profession's past and advice for ways the agricultural education can remain strong and productive. The July-August issues will be devoted to reflections by high school teachers, the September-October issue will include state supervisors, and the November-December issue will provide a perspective from teacher educators.

Here is where I need your assistance. Because of my involvement in the profession as a teacher educator, I have a good perspective on the leaders/former leaders from that area. Although I was a high school teacher for nine years, my perspective on that group is at best regional. My perspective on the state supervisors is more limited than my knowledge of the high school teachers. I would like your assistance in identifying individuals that would be willing to share their reflections, as well as their advice, with the profession in this format. Allow me to share my thoughts on the qualifications that I am looking

for. I am looking for:

- Individuals with a minimum of fifteen years in the profession,
- Someone that is recognized as a leader in the region, preferably the nation,
- An individual that is knowledgeable, if not active, in the profession, and
- Someone that is willing to share their knowledge and experiences with the profession.

I am asking readers to nominate individuals in three categories: teacher educator, state supervisor, and high school agricultural education teacher. Please provide me with their name, address, the category for which you are nominating them, and a brief statement on why you think they should be included in this activity. The brief statement will be vital in the selection of six to ten individuals to contact. Thank you in advance for assisting me with this effort. I am excited to hear from some of the "giants" of the profession.

A special thanks to Dr. Andrew Thoron for his efforts on assembling the July-August issue on assessment in agricultural education. I hope you enjoy the articles and pick up some pointers on assessing the quality of your program.



Dr. Harry N. Boone, Jr., is a Professor at West Virginia University and Editor of *The Agricultural Education Magazine*.

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Articles and photographs should be submitted to the Editor or Theme Editor. Items to be considered for publication should be submitted at least 90 days prior to the publication date of the intended issue. All submissions will be acknowledged by the Theme Editor and/or the Editor. No items are returned unless accompanied by a written request. Articles should be approximately four double spaced pages in length (1500 words). Information about the author(s) should be included at the end of the article. Photos and/or drawings appropriate for the “theme issue” are welcomed. Photos/drawings should be submitted in an electronic format (jpg or tiff format preferred – minimum 300 dpi). Do not imbed photos/drawings in the Word document. A recent photograph (jpg or tiff format preferred– minimum 300 dpi) of all authors should accompany the article unless photographs are on file with the Editor. Articles in the *Magazine* may be reproduced without permission but should be acknowledged.

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Accountability in Education: It's Not Going Away, and School-Based Agricultural Education has a Role, Meet it head-on!

by Andrew Thoron

Accountability has increased in scope across the nation in recent years. The use of student driven data and data interpretation are no longer an administration-only topic. Across the nation we have teacher retention, pay, supplements, school-grades, student certificates/diplomas, and overall success based on accountability measures. One concept remains, as more standardized accountability measures are put in place (state standardized exams, end-of-course exams, and certifications), there becomes less time to focus on effective teaching unless there are ways to incorporate usable high-quality assessments.

Agricultural education has not been exempt from the “accountability” movement in education. Programs are expected to implement

practices that will provide data to evaluate student performances and overall program quality. The purpose of this issue of *The Agricultural Education Magazine* is to show how professionals have taken this as a charge to showcase their classroom learning environment through effective assessments. Throughout this issue's theme the reader will learn how two teachers from the state of California have partnered with their university faculty member at Cal Poly to account for program accountability in their schools. Further, school-based agricultural education (SBAE) is a true delivery method for a TOTAL STEM program. Effective communication with administration and through authentic student formative assessment we can showcase accountability and become part of the discussion during STEM plans enacted in high schools across the United States. This issue contains expert thoughts from the University of Tennessee on how to accomplish math formative assessments.

Incorporation and showcasing laboratories as an effective teaching tool through assessment bring to the forefront of a successful SBAE program. Dr. Kate Shoulders provides highlights on effective use of laboratories and their “worth” as an integral part of the Ag-STEM pro-

gram. Further, two young teacher from Florida conceptualize the use of CDE's and Agriscience Fair projects as ways to document accountability of the SBAE program. This also leads to highlighting student learning and it goes without saying the best showcase and perhaps the most unique to SBAE is through SAE. Dr. Eric Rubenstein wrote about using SAE as an effective accountability with students and the program components essential to SAE in the time of accountability in public schools.

In sum, accountability and assessment can be something we are troubled by in education. Learning how to effectively showcase the measures and using tools that are unique to SBAE can bring our programs into the full discussion as agriculture being the true integrated science, the best way to bring all components of STEM accountability measures to the forefront of the school's assessments and accountability plan. Start this school year strong and look for way to incorporate what the authors share in this issue.



SAE records become a vital part of an assessment strategy for agricultural education programs. (Photo courtesy of Eric Rubenstein (p. 15))



Dr. Andrew C. Thoron is an Assistant Professor in the Department of Agricultural Education and Communication, University of Florida and the Theme Editor for the July August issue The Agricultural Education Magazine.

Incorporating Mathematical Formative Assessments in the Agricultural Classroom

by Danielle E. Sanok and Christopher T. Stripling

Incorporating mathematical concepts in the agricultural curriculum and gauging students' knowledge of the content can often be a difficult task. Assessments are used in the agricultural classroom on a daily basis to measure student learning, but how can we make better use of our assessments? The two main types of assessments that are used most commonly are summative and formative assessments. Summative assessments are most commonly used as benchmarks to monitor student achievement but are also used for school accountability (McMillan, 2007). Summative assessments are used after instruction and can have varying results on the effect of

student learning (McMillian, 2007). Formative assessments provide teachers and students with a structure for next steps in learning (McMillian, 2007). Formative assessments help students to visualize connections and meaning in smaller, successive steps in new knowledge and prior learning, which ultimately enhances student achievement (McMillian, 2007). Formative assessments allow for teachers to track their students' progress, where students are in relation to desired learning goals, what changes in knowledge or skills are needed, and what the next steps are in learning (McMillian, 2007). Since formative assessments are often completed in a series of steps, teachers can uncover their students' logic and thought process more clearly (McMillian, 2007). All of this allows the learning process to be more transparent to students and teachers (McMillian, 2007).

In order for students to develop connections for impactful learning in the agricultural classroom, especially when applying mathematical concepts to agriculture, the use of formative assessments is highly encouraged. Mathematics in the agricultural classroom is more than just facts or memorizing formulas; students need to have a deeper understanding of the subject and the mathematical process (McMillian, 2007). When using mathematical formative assessments it is vital

that there is a clear purpose, clear targets (see Figure 1), accurate assessments, and effective communication (McMillian, 2007). There are five main types of formative assessments that can be used when applying mathematics in the agricultural classroom: (a) before an assignment is given, (b) during direct instruction, (c) during individual or group work on projects, (d) before summative assessments, and (e) after summative assessments (Brookhart, 2010). In the next few sections, we will outline the purpose and provide an example of each type of formative assessment mentioned above.

Before an Assignment is Given

Purpose: As a teacher it is vital that the assignment is properly identified. This helps teachers to determine if their students are interpreting the assignment correctly and if there is anything missing from the students' description. The purpose of this type of formative assessment is to have students focus their thinking so their work will support the learning target (Brookhart, 2010).


Example: Have students identify the purpose of the assignment and in their opinion, what a 100% should look like. As a teacher, look for accuracy, relevance and completeness of the assessment (Brookhart, 2010). Students can work in groups to reach a clearer learning target. Refer to the before assignment "Learning Target" assessment handout (see Figure 1) for a more detailed example.

During Direct Instruction


Purpose: In order to determine that student reasoning matches the

Learning Targets

Assignment: _____



What is the agricultural math assignment?



What would a 100% look like?

Source: Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

Figure 1: Learning Target Handout

"Why" Boxes

Solve the problem below and show your work. Please use the boxes to explain why you took each step.

Math Problem:

Solution	Explanation
	Why?
	Why?
	Why?
	Why?

Source: Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

Figure 2: Why Boxes Handout

learning target, formative assessments during direct instruction are needed.

Example: Ask students to solve the problem, show every step, but most importantly have students explain the reasoning behind their work (Brookhart, 2010). By having students write down their reasoning, misconceptions become more visible and you can identify skipped steps, which will aid future instruction (Brookhart, 2010). It is important to make sure that student reasoning matches their work in each step and you should be cognizant of multiple ways to solve a problem (Brookhart, 2010). Students may work in small groups in order to review each other's reasoning and determine if it is accurate and complete. Refer to the during direct instruction "Why Boxes" assessment handout (see Figure 2) for a more detailed example.

During Individual and Group Work on Projects

Purpose: Formative assessments in this category are useful for further understanding of a learning object or when preparing for a particular assignment.

Example: Student-teacher conferences are often a useful way to formatively assess if a student is on target for learning. Have students create a list of questions that they want to discuss during their conference in order to use conference time efficiently. Also, by giving students the responsibility of the conference agenda,

ownership is created (Brookhart, 2010). Make sure that students provide clear questions, that the information is what the student genuinely wants to know or improve upon and that the student did not miss something important about their work (Brookhart, 2010). After the conferences are completed, student work should be observed to see what effect the conference had on the student's achievement. If time limits the ability to conduct student-teacher conferences, you can have students write down questions, display the questions on the corner of their desk, and answer questions on an as need basis (Brookhart,

2010). Refer to the during individual and group work on projects "Conference Call" assessment handout (see Figure 3) for a more detailed example.

Before Summative Assessment

Purpose: Before a summative assessment is given, it is important that students can visualize their progress. Repeated formative mathematics assessments can help students predict their summative scores, but also help the students make gradual improvement over time (Brookhart, 2010).

Example: Have students predict their score before their repeated formative assignment, graph it, and then graph their actual score to determine how accurate the student was. When students have the opportunity to reflect on their progress, they can plan strategies for improvement, and hopefully overtime their predictions and outcomes will be more accurate (Brookhart, 2010). Refer to the be-

Conference Call

Assignment: _____

For this assignment, list the three things related to agricultural mathematics problems you need to work on the most. Also, answer the following questions for each area of improvement.

1.	a. Can I do this myself? <input type="checkbox"/> Yes <input type="checkbox"/> No b. If no, who could help me? <input type="checkbox"/> Teacher <input type="checkbox"/> Other Student _____ <input type="checkbox"/> Family Member _____ c. How likely am I to succeed? <input type="checkbox"/> Not very <input type="checkbox"/> Possibly <input type="checkbox"/> Likely
2.	a. Can I do this myself? <input type="checkbox"/> Yes <input type="checkbox"/> No b. If no, who could help me? <input type="checkbox"/> Teacher <input type="checkbox"/> Other Student _____ <input type="checkbox"/> Family Member _____ c. How likely am I to succeed? <input type="checkbox"/> Not very <input type="checkbox"/> Possibly <input type="checkbox"/> Likely
3.	a. Can I do this myself? <input type="checkbox"/> Yes <input type="checkbox"/> No b. If no, who could help me? <input type="checkbox"/> Teacher <input type="checkbox"/> Other Student _____ <input type="checkbox"/> Family Member _____ c. How likely am I to succeed? <input type="checkbox"/> Not very <input type="checkbox"/> Possibly <input type="checkbox"/> Likely

Source: Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

Figure 3: Conference Call Handout

fore summative assignment “Charting Improvements” assessment handout (see Figure 4) for a more detailed example.

After Summative Assessment

Purpose: Formative assessments after a summative assessment provide students the opportunity to measure the effort put into their work.

Example: If using a formative assessment after a summative assessment, be sure the summative assignment is not returned back to the students until after the formative assessment is completed (Brookhart, 2010). This will allow students to gauge their effort without being influenced by the grade they received (Brookhart, 2010). This type of reflection will allow students to see if their effort and grade differed from what the teacher believed based on feedback provided (Brookhart, 2010). When the work is returned, students will be able to reflect on the connection between their effort and their achievement,

which should create more motivated learners (Brookhart, 2010). Refer to the after summative “Effort Meter” assessment handout (see Figure 5) for a more detailed example.

In summary, after all formative assessments are provided and completed, it is important for teachers to evaluate the effectiveness of formative assessments in the classroom. Look for how well the formative activities were integrated into instructions, how the students used the strategies provided, and how engaged students were during the activities (McMillian, 2007). Furthermore, there must be a continual process of evaluation of student work, student behavior, and feedback to the students as well

(McMillian, 2007). This will allow students and teachers to build upon new or current understandings, expand on prior learning, and correct any misunderstandings (McMillian, 2007). Mathematical formative assessments also allow teachers to gain instructional feedback and adapt their teaching style to better suit students’ needs and guide future steps in the learning process.

References

Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

McMillan, J. H. (2007). *Formative classroom assessment theory into practice*. New York, NY: Teachers College Press.

Charting Improvements

Before you complete your agricultural math assignment, mark the date the assignment was given and color in the bar graph indicating what you believe your score will be. When your assignment is handed back, color in the bar graph with your actual score. Keep this weekly log to chart your improvement.

100									
95									
90									
85									
80									
75									
70									
65									
60									
55									
50									
45									
40									
35									
30									
25									
20									
15									
10									
5									
	Perceived Score	Actual Score	Perceived Score	Actual Score	Perceived Score	Actual Score	Perceived Score	Actual Score	
	Assignment 1		Assignment 2		Assignment 3		Assignment 4		
Date									
Assignment Score									
Student Prediction									

Source: Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

Figure 4: Charting Improvements Handout

Effort Meter

Assignment: _____

Color the meters in order to answer the questions.

5

How hard did you concentrate on the math problem?

5

How much time did you spend on the math problem?

5

How carefully did you work on the math problem?

Why did you give these ratings?

Source: Brookhart, S. M. (2010). *Formative assessment strategies for every classroom* (2nd ed.) Alexandria, VA: ASCD.

Figure 5: Effort Meter Handout



Danielle E. Sanok is a Graduate Assistant at the University of Tennessee



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Accountability: A Tale of Two Teachers

by Shawna Clark, Amanda Ferguson,
and Ann M. De Lay

Accountability demonstrates one's capacity to act responsibly with entrusted resources and disclose outcomes to others. In its many forms, accountability is of real concern to everyone involved in education. From student, to teacher, to administrator, to state and national official; all levels involved in funding, development, delivery, and testing of teaching and learning are, to some degree, held accountable. Accountability is ensuring allocated resources turn into some measure of success. Standardized testing is often

prove they have met the objectives. By reflecting throughout the lesson cycle, teachers identify in what ways they and their students are accountable and where they are falling short. In less successful moments, teachers can implement alternate strategies to get everyone back on track. At times, even the most talented teachers find they and their students fail to measure up and question what more they can do to ensure success.

Two California agriculture teachers have implemented innovative approaches toward increasing accountability in their classrooms. Shawna Clark, agriculture teacher at Palmdale High School, has linked

consumer and a predetermined set of rules directed by their perception as a unit of measurement. The challenge is, "Who is the customer?" Is it the student, the individual who can benefit from an array of teaching styles, a variety of learning tools, and the integration of technology? Is it the community or local industry that benefits since they are the entities looking to utilize a self-starter, a leader, an individual who knows how to communicate, collaborate and critically solve problems? Who is my customer?

The answer is all of the above! As a high school agriculture teacher in an urban high desert community, I have learned what accountability means in my unique setting. My students need to connect with one another and with the outside world. They need to find something that connects them to the concepts they are learning. I do not want to train cactus gardeners in a rainforest. I want to instill within my students the understanding they are needed in their community. We may not raise many steers in the desert but we can sure grow carrots, poultry, rabbits, and goats. We even have some sheep. The fact of the matter is it does not make sense for me to teach students about food and practices they will not experience firsthand.

From a cultural position our school is working hard to integrate our community into our campus. We have community partners introducing technology based on industry. They have contributed to the expansion of our campus-wide technology integration through monetary contributions to create state-of-the-art teleconferencing labs. These labs have been used with the recent integration of STAR within our local Agriculture Earth Science course.

Learning should have application to the real world and its relevance should be transparent.

the tool used to evaluate accountability, but many stakeholders agree standardized testing fails to capture the complete picture of student learning and does little to establish relevance or intrinsically motivate students toward achieving their full potential.

Good teachers maintain a strict determination toward inviting students to learn, sometimes dragging and pushing when needed. The daily focus of connecting learners to concepts begins with the lesson plan. More than just words on a page, lesson planning involves a mindset toward accountability. Teachers begin with standards and objectives then identify forms of accountability, also known as assessments, to let students

her local Agriculture Earth Science class with a class in North Carolina and with industry through the STAR (Science Technology Advanced Resource) program. Amanda Ferguson, agriculture teacher at Minarets High School, utilizes a non-traditional, *teacher as coach* instructional method to increase accountability among her learners. Although they teach in schools embracing these approaches, listen as they give voice to their unique situations and consider how each might have application to other school and class settings.

Shawna Clark - Palmdale High School

My definition of accountability is based on both the expectation of the

Developed in North Carolina by Rebecca Triplett-Johnson, STAR connects schools with advanced expert resources in the fields of science, technology, engineering and math [STEM], through Internet based interactive webcasts and events. STAR is adaptable to the educator's curriculum and teaching style and is customized to bring the most *real life* science and technology based topics to the classroom. This fulfills the needs of both educators and students across the technical spectrum, for careers in agricultural science and beyond. The adaptability allows the educator the ability to use the program in any imaginable way and follows the national STEM Initiative to promote STEM awareness. The Lockheed Martin Advanced Development Programs, "Skunk Works®," [LM-SW] believes in the STAR concept and has elected to engage as a partner in bringing STAR to students across the nation. Other industries and experts throughout the country are also working with the program.

In the spring of 2014, the STAR education program launched its first live webcasts from North Carolina to California. Austin Caviness from WXII-12 TV of Winston Salem, North Carolina presented a lesson to my class from 2,423 miles away. Caviness used industry-standard weather technology to discuss the science of weather, relating his points to the concepts being studied by my class. Through the STAR technology, the students and industry presenter could interact with one another in real time. They were able to ask and answer questions, share information, and view a variety of graphics on the screen. Students took notes and were presented with an assignment by Caviness, which lead into the next class study and future STAR sessions.



From a teaching perspective, STAR has increased accountability for me by encouraging me to create lesson plans, stick to them, and then follow through with learning objectives in a timely manner without adding stress or increasing my workload. This unexpected benefit broadened my perspective on assessments. I have always maintained a project-based, student-centered classroom. However, instead of assessing each unit studied and moving on, I now see how concepts connect at a deeper level and across different units and courses. Sharing and encouraging these connections has improved my students' critical thinking and problem solving skills. As a result, they design projects and lessons on their own and voluntarily look for ways to expand their knowledge base.

From a student accountability perspective, my class has elected to take ownership of their learning. My students are excited about class and motivated to remain in the STAR program. They have improved their grades, even though grade point average is not a STAR requirement. They have also begun to visualize themselves in careers they had never before imagined possible and are discovering their potential is endless. I have never witnessed students working so hard collectively. They now refuse to settle.

On STAR presentation days, my students demonstrated awareness of how their choices in dress, actions and attitudes represent themselves and our school. They made the decision to dress up for STAR classes and looked forward to a more mature, professional interaction with their classmates and the STAR presenters. They found within themselves the ability to pass the knowledge forward by presenting the program to our school board, to other classrooms in Palmdale, and even to schools across in North Carolina as *STAR student-to-student mentors*. At the end of the semester, the program recognized my students for their outstanding commitment and leadership. For some, it was the first time they had ever been recognized but more importantly, they enjoyed the class, they wanted to be in school and this shift in perspective showed in the quality of the work they produced.

An increased accountability in school has translated into greater industry response. Local industry partners have established a relationship with our school and with my classroom. After our initial sessions with Austin Caviness, we have had engineers and a U-2 pilot teleconference with us and were even invited to participate at the LA County Airshow as Lockheed Martin volunteers. Next year, we will continue to integrate the program into our courses and will

collaborate with our local community in order to expand these opportunities for our students. In many ways, we have all become accountable to and for one another.

Accountability is of great importance to me and the unit of measure is based on perspective. While test scores offer one form of evidence, I believe my students are my primary customer and their success in the local community is the ultimate measure. By developing their ability to work hard, take responsibility for themselves and question absolutely everything, I am helping these employees of tomorrow to be viable members of our community and agricultural industry today.

For more information or to participate in the STAR program contact: Rebecca Triplett-Johnson, STAR Program Developer and Coordinator (336) 957-7753 Rebecca@star-classroom.org

Amanda Ferguson – Minarets High School

If I were to visit a kindergarten classroom, I would expect to find loud noises, an area or two for making messes, and lots of laughter. Given the average age of a kindergartener is five, we know anytime they interact with one another they are learning and do so with great enthusiasm. Sadly, if I were to visit virtually any junior high or high school campus I would be hard pressed to find the same fun-loving atmosphere. Somewhere in the academic progression classrooms become stuffy, closed-off, simplified and streamlined. Students allow apathy and external motivators dictate their actions. Despite the reality, we as teachers still believe interaction is learning. Why can't learning always be messy? Why can't learning always be loud? Why can't learning always be fun?

I can personally guarantee on any day of the week a visitor to Minarets High School would observe chaos, fun, and engagement campus-wide. One would not see a teacher merely lecturing at the front of the room and students frantically trying to capture notes with paper and pen. Rather, one would witness students working collaboratively and creatively alongside the teacher in a fast-paced, technology rich environment. Minarets is a 1:1 technology based school and prides itself on developing students into accomplished young professionals. Teachers in this unique campus community are genuinely willing to try new things and feel a hands-on approach is the best way for students to learn and be successful in the future.

One of the easiest ways to ensure student accountability is to establish working and professional relationships with them. Minarets has crafted a unique culture among parents, students, teachers and administrators. My class sizes rarely, if ever, go over twenty-five. I teach in a tech-based, active learning environment. The majority of my students genuinely want to be in class and do well. While I realize I am extremely lucky, I also recognize the contribution these factors have on student accountability. When students want to be in class and feel valued, they feel deeply compelled to contribute and deliver.

At Minarets, we are on a block schedule meeting for 85-minute periods every other day. I encourage my students to communicate in class daily, with me the instructor and with other students. Once the bell rings, they are out the door and I will not see the group again for roughly 46 hours. Two days is a long time when it comes to education. To resolve this challenge, I maintain an open and

constant line of communication with students as well as parents. Students are able to message me through our online classroom platforms, email me, text me, or even reach me on my cell phone. I am even friends with many students and parents on Facebook, an outlet supported and encouraged by our administration. This multi-faceted communication approach contributes to the great working relationship we enjoy in the classroom.

The campus climate enriches and supports accountability, enabling me to integrate additional measures into my classroom. I regularly *trade places* with my learners to increase student accountability. In this strategy, the student takes on the role of teacher. It is common for me to divide a lesson and assign a piece to each group of students for exploration and investigation. Group members work collaboratively to prepare their lessons and present their findings to the rest of the class. I have had students present practice problems, prepare demonstrations, and ultimately teach an entire unit to their peers.

My most recent experience with this method occurred when we covered gas laws in Agricultural Chemistry. I chose four common laws I felt students could easily research online. Each group was tasked with providing the class a brief history of discovery, complete three practice calculations with their classmates, and prepared a physical demonstration of the law. Each group presentation took roughly 20 to 30 minutes. Presenters struggled with working out practice calculations to a point where classmates could understand them, I then offered assistance. The demonstrations, however, were off the charts! Learners really grasped the basic understandings of each law from peer explanations and demonstration visuals.

Some fear students will not learn important information unless taught by a high quality educator using a more traditional mode of delivery. Acting as facilitator, my role in this method is to offer simple organization and sustained guidance to groups based on their questions and the directions they choose to pursue. I will sometimes pause their presentations in order to ask challenge or probing questions. These are intended to simply engage the students in a deeper understanding of the content but my instructional input is minimal. The teacher's role in this method is different but it is just as vital as in any more traditional method.

Experts have applied a number of labels to this method. Regardless of label, my students have proven they can learn just as well from one another as they can from me. Additionally, my students enjoy coming to class and take away major understandings daily with the potential to benefit them in both the present and the future. Assigning pieces of the lesson to students affords them the opportunity to take ownership of the

content. This ownership results in an increase in student engagement, involvement, and overall retention of content. Rather than being passively fed the information by the instructor, they are required to perform. These students must produce or be responsible for the gap in their peers' learning. The stakes are higher and so is accountability.

Minarets High School has adopted a culture that moves away from considering teachers as *imparters of knowledge* and toward a direction of *teachers as facilitators and coaches*. The administration, faculty and staff seek every opportunity to empower students to act and guide them as necessary. Much like those lively kindergarten classrooms we believe learning should be messy, hands on, interactive, loud, and fun. Above all, learning should have application to the real world and its relevance should be transparent to each learner. In this environment, students eagerly deliver their absolute best with every test of accountability. Utopia? Not exactly, but it sure feels like it!



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Assessment strategies include the measurement of student skills. (Photos courtesy of Eric Rubenstein (p. 15))

The Balloon Dog Scenario: How Assessment can Make or Break your Laboratory Activity

by Catherine W. Shoulders

Every profession has a coveted trinket whose ownership represents career success. Olympians have medals. Movie stars have Oscars. Football players have rings. Agriculture teachers? They have keys. These keys aren't put on a lighted mantel or displayed in a shadow box for marveling guests; they are carried with pride on belt loops, lanyards, in purses or pockets, ready to be utilized at a moment's notice. The more keys you have the more laboratory facilities you have available for your students

agriculture teacher to enhance student learning can only be considered a successful program addition if it really does enhance learning. Assessment of student learning in laboratory settings can be daunting. Each laboratory requires a specific set of skills in addition to specific content knowledge, and students' abilities to master these skills differ just as greatly as their abilities to master content. While there are countless ways to assess student learning in laboratory settings, this article will provide you with a few options when considering different assessment methods in your agricultural laboratories.

fall in to three categories, much like teachers do when they use subjective assessment methods; the "effort" graders, the "easy" graders, and the "hard" graders.

The "effort" graders are the ones who give all students who displayed a balloon an A score. They defend their decisions by stating that while some dogs don't really look like dogs and other balloons popped in the process, the students each put forth the effort to learn the steps and attempted to display their knowledge of these steps. They went through the process of creating a balloon dog, even if their dog didn't turn out well. The "easy" graders are the ones who eyeball the dogs, give A scores to all that look sort of like dogs, give B scores to all the ones who don't look like dogs, and give C scores to all that look like sad little popped balloons. These "easy" graders justify their decisions by stating that while students couldn't help but work within the confines of their own talent or bad luck, they did need to produce some sort of usable product at the end. The bad luck of a popped balloon shouldn't result in the student failing the assignment, but the lack of a usable product should at least be penalized. The "hard" graders are those that carefully compare each dog to the ideal one from the video; everything from choosing the wrong color balloon to having legs that are too short and a tail that is too long results in docked points, so A scores are only awarded to those dogs looking almost exactly like the one from the video, and a popped balloon results in a failing score. The "hard" graders defend their scoring by stating that in the real world, a professional balloon dog maker wouldn't be able to stay employed if their dogs were of low

Laboratory facilities can only be considered a success addition if it enhances learning.

to experience. Greenhouse keys, shop keys, food lab keys, livestock facility keys, and even keys to farm equipment let students and other teachers know that your agriculture program is one where learning happens outside of the traditional classroom, enabling hands-on experiences tailored to a variety of agricultural interests. The jingle of an agriculture teacher's keys can be heard all the way down the hall – and the agriculture teacher knows this is a sound of success.

But while each key added to the collection enhances the harmony of a program's melody, it also adds additional weight to the teacher, and not just in the form of a piece of metal. Every laboratory facility used by an

Types of Graders in the Laboratory

When introducing the concept of authentic assessment to my pre-service teachers, I always start with balloon animals. Each student gets a long balloon, and they watch a video showing instructions on how to create a balloon dog. Once all dogs are made (which takes a few reruns of the video), we line them up to have a balloon dog show. Even balloons that popped in the process of creating the dog are put on sad display among their more robust dog-looking competitors. Students then score each dog on a scale of 0-100. After all scoring is finished we discuss how each dog was scored. Inevitably, students

quality or were not produced. This grading system prepares potential balloon dog makers for their future careers in a realistic manner.

This subjective method of assessment is well-practiced in laboratory settings, and teachers can witness the same effects on their students as I do on my pre-service teachers during the balloon dog activity. When graded on the “effort” system, students whose balloons popped are satisfied, while those who painstakingly worked to create the perfect balloon dog feel jilted. In the future, a teacher can expect students to put in a bit less effort, since all are awarded with the same grade as long as they try. The effects of being graded on the “easy” system are similar. While those that worked hard feel their efforts were recognized a bit more than on the “effort” system, they will see that working a bit less hard will not impact their grades. When graded on the “hard” system, those who spent effort making perfect balloon dogs will hang their well-earned grades on their refrigerators, while those with the bad luck of popping their balloons will hang their heads in shame, or worse yet, become frustrated at the teacher because of their perceived lack of opportunity to display their true abilities.

The impacts of subjective grading systems go beyond students’ feelings and future efforts. Their ability to accurately assess student learning varies as well. The “effort” system attempts to assess students’ skills rather than their products, but more frequently succeeds in only evaluating students’ ability to stay busy during an activity. The “easy” system attempts to assess skills and products within the realities of external factors such as dud balloons or natural talent, but does not distinguish between the more subtle differences between

students’ abilities, preventing the teacher from accurately identifying specific areas of improvement for specific students. The “hard” method comes the closest to truly assessing and distinguishing between students’ abilities, but does so at the cost of many students’ confidence, thereby overshadowing the whole reason we teach in the first place.

Objective Rubrics

So what is an agriculture teacher with a group of welding students (or a pre-service teacher with a lineup of balloon dogs) to do? I recommend finding or creating an objective grading rubric that includes both process and outcome benchmarks for all laboratory activities. Every time I ask students to complete an assignment, I want them to do so knowing within a few points of what their final grade will be. Every point is a choice and they can either choose to earn that point or choose to give up that point. In the balloon dog scenario, we follow the system teachers typically use to create rubrics: we create a list of the important content knowledge and skills students should learn, identify components of the activity that should display whether students learned these, and determine the importance of each of the components to assign appropriate point values. The end result is a rubric that tells students how many points each component of the activity is worth, allowing them to choose whether they earn those points. Process benchmarks might include those that count the number of twists made in the creation of a balloon dog so regardless of the end result, we know the student learned how to conduct the act of properly twisting the balloon. Product benchmarks might include those that measure the length of the dog’s legs against an ideal length so we know that the student maintained

a quality product. Using a class-created rubric, the vast majority of my pre-service students give consistent scores to the balloon dogs, indicating their grades are not given based on their subjective opinions, but rather on an agreed-upon set of standards.

Challenges of Rubrics

Even with rubrics, assessment in agricultural laboratories is not without its difficulties. One of the main challenges with agricultural laboratories is that some students may have grown up using that laboratory, while others may have never set foot in that laboratory before (consider the student who grew up on a poultry farm, and the one who has only ever eaten processed chicken nuggets). When evaluated with a rubric that uses both process and product benchmarks, both types of students have an opportunity to earn high grades on their assignments. However, one student might work harder than another to receive this grade. Therefore, a key factor to a rubric’s effectiveness is the amount of time students are given to complete an assignment. Teachers have different methods of determining student time allowed on a laboratory assignment, but I have found that permitting students to work on labs during their own time after school or during their breaks enables those with bad luck or little previous experience to hone their skills, should they so choose.

Another challenge to a rubric’s effectiveness is the teacher’s delivery of the rubric to the students. The goal of the rubric is to allow students to consciously make choices about the points they wish to earn and allow them to identify the exact actions they need to take to perform the laboratory activity to their desired outcome. Therefore, allowing all students to easily access the rubric before the laboratory activity begins

is crucial; students graded on details of a laboratory activity of which they were unaware will only cause frustration among the students, and will defeat the purpose of the rubric.

Rubric Creation

At this point, I'm sure you have taken away the main message of this article: rubrics should be created for every laboratory assignment to ensure objective grading, and those rubrics should include both process and outcome benchmarks. Let's take a look at how one is created:

Laboratory: The Equine Facility

Activity: Effectively Groom a Horse

Objectives:

AS.07.01.02.c. Select equipment and implement animal handling procedures and improvements to enhance production efficiency.

AS.06.01.01.c. Interpret animal behaviors and execute protocols for safe handling of animals.

AS.03.01.02.c. Treat common diseases, parasites and physiological disorders of animals.

You will notice the activity is to effectively groom a horse and that objectives have been selected from the National Agricultural, Food, and Natural Resources Content Standards to align with the activity. Essentially, if you have an activity that does not align with any standards recognized by your school, you don't have any reason related to learning to conduct the activity. Please note that some agricultural programs are responsible for activities that have goals other than learning, and that these activities may not align with any standards. If the goal is student learning, the activity should align with some set of learning standards. The components of the activity are then listed; these

Process Criterion:	Objective(s) Assessed:	Points Possible:
Student appropriately uses each piece of grooming equipment contained within the grooming kit.	AS.07.01.02.c AS.03.01.02.c	20 (4 for each piece of grooming equipment)
Student restrains the horse in a safe and effective manner.	AS.07.01.02.c AS.06.01.01.c	5
Student maintains safe handling practices throughout the grooming.	AS.06.01.01.c AS.07.01.02.c	24 (2 points docked for every documented unsafe practice)
Student recognizes any diseases, parasites, or physiological disorders present.	AS.03.01.02.c	5
Outcome Criterion:		
Horse's coat, mane, tail, and hooves are free of debris and tangles.	AS.07.01.02.c	16 (4 points for each component)
Horse has been properly treated for any thrush, bot eggs, or cuts.	AS.03.01.02.c	5
Horse maintained a relaxed behavior throughout grooming.	AS.06.01.01.c.	5

are the components of the activity which the teacher has deemed important, and each of them is aligned with an objective. Therefore, if the student adequately performs the activity component, he or she has met that objective. These components are separated into processes and outcomes. Those under processes should be able to be met by every student, regardless of his or her previous experiences, if he or she has learned the content and skill. Those under outcomes are within reach of every student as well, but may take some students longer to master than others as they may be influenced by previous experiences, the horse's temperament, and other factors outside of the student's control. Finally, the listed point values indicate to students the importance of each component, and how he or she

might earn points. For example, as a student, I know that if I make twelve unsafe handling actions, I will receive a zero for that criterion. Additionally, if I know I am running out of time in the class or I am particularly afraid of horse hooves, I may consciously decide to forgo the four points for picking the horse's feet. Each student in

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Assessment: SAE

by Eric D. Rubenstein

Student involvement in supervised agricultural experience (SAE) programs has been declining for over 20 years within agricultural education programs (Barrick et al., 2012). Lewis, Rayfield, and Moore (2012) postulated that if more teachers assessed SAE programs that student participation would increase due to the course requirement. However, many teachers struggle with determining adequate measures and means to assess students' SAE programs (Dyer & Osborne, 1995). The agricultural education profession must continue to ensure that SAE programs remain a viable component of school-based agricultural education (Barrick et al., 2012). In a recent study, Rubenstein (2014) found that agriculture teachers, in the examined programs, required every student to engage in an SAE program where they were assessed and received a numerical grade if they were enrolled in an agricultural education course. Therefore, this particular article will focus on different measures that can be utilized by agriculture teachers to assess students' SAE programs.

Goal Setting

To assist in assessing student SAE programs, teachers should require agriculture students to develop program and personal goals that coincide with participation in their SAE program (Rubenstein, 2014). The goals that students establish should be: specific, relevant, and individually developed (even if conducting a group SAE). The developed goals are then reviewed by the agriculture teacher to ensure that the goals are pertinent to students' SAE program involvement. A grade

should be assigned at this point in the process based upon student effort, completion, and quality.

Throughout the school year, agriculture students should reexamine their established goals to assist in motivating themselves to continue to achieve their aspirations. With the help of the agriculture teacher, agriculture students can determine if they have met, exceeded, or need to change their program and personal goals. These goal evaluation sessions can be conducted during classroom instructional time for a portion of a class period. Therefore, providing agriculture teachers time to engage in discussions with students regarding progress in their SAE programs.

At the end of each school year, students submit a record book that details their goals and the completion of each goal. This should include a short narrative describing how the student achieved their goals and how their SAE program has grown based on the goals that they set for themselves. Grading of this portion of the SAE program can be objective or subjective in nature. The grading requirements for SAE goals are: student performance towards completion of the goal, improvement in the SAE program, and student learning. If grading objectively, a rubric should be provided to the students prior to the assignment being collected. If grading subjectively, students should be informed of the agriculture teacher's expectations both verbally and in written form prior to the assignment being collected.

Student Learning

Student learning has been found to be a vital component of an exemplary SAE program (Rubenstein, 2014). However, many educators struggle

to adequately evaluate students' learning in SAE programs. During the development and implementation of an SAE program, agriculture teachers must discuss their expectations for student learning. To assess student learning agriculture teachers can have students complete an SAE showcase presentation. The expectations of the SAE showcase should be presented to students when they enter their agriculture education course and plan their SAE program. The SAE showcase occurs at the end of the agricultural education course. The purpose of the SAE showcase is for students' to present and demonstrate what was learned in their SAE program. The showcase should be 5-10 minutes in length and students should have a visual aid.

Throughout the school year different portions of the SAE showcase presentation should be reviewed by the agriculture teacher to ensure that students are engaged in the process. These assignments can vary from submission of photos, written responses to a set of questions, or through video presentations. These assignments provide the agriculture teacher with an inside look at the progression of students' SAE programs. Further, these assignments allow the agriculture teacher to provide students with classroom and on-site supervision and support.

At the end of the agricultural education course students sign up for a presentation time and date. Prior to the assigned presentation, instructional time may be given to students to finalize their visual aids and other presentation materials. Depending on the agriculture teacher's personal preference, the final presentation materials can be collected all at the same time

from students or can be collected following their presentation to their peers. The presentation and materials should be graded objectively based upon a rubric that was developed by the agriculture teacher. The rubric should include: visual aid quality, demonstrated learning, acquired new skills, and presentation quality. The learning that occurred during the SAE program can be graded in a subjective manner based upon students' personal growth while engaged in an SAE program. When grading students' personal growth, the agriculture teacher should consider the learners' abilities, SAE program, and resources.

Program Growth and Development

While engaged in an SAE program students should be required to complete a record book (Rubenstein, 2014). Record books have become more accessible to students through the introduction of the Agriculture Experience Tracker program. Students are able to update their records from their smartphones or home computers. Further, students are able to remain updated during instructional time when they have access to a computer. Regardless if students have access to an electronic record keeping system, the record keeping process is an important component of SAE programs. Students' record books contain information regarding their financial investments, decisions, and learning achievements.

On a monthly or bimonthly basis, agriculture teachers should objectively grade students' SAE record books. During these monthly or bimonthly checks, agriculture teachers should review the records for completeness, engagement in the SAE program, goal achievement, and student learning. Furthermore, with each record book check agriculture

students should be required to answer a few questions about the decisions that they have made in their SAE program. For example:

- 1) ***What have you learned through your SAE program?*** How will the knowledge and skills that you have acquired help you in furthering your SAE program?
- 2) ***What decisions have you made in your SAE program?*** What impact have these decisions had on the outcome of your SAE program?
- 3) ***Have you made any income through your SAE?*** If so, what have you done with your SAE income? If not, why do you believe that you have not made any money?

At the end of the course, agriculture students should be asked to complete the following assignments: close out their record books, reflect on their responses to the monthly or bimonthly questions, and describe their proposed project for the following year. Agriculture teachers should then review the completed assignments and provide each student with feedback about their current SAE and their proposed project. These documents can be kept by the teacher for the following year. The monthly or bimonthly and end of year record book checks should be graded in an objective manner based upon a rubric that was provided to students prior to each assignment.

Summary

While SAE programs continue to be an essential component of an SBAE program, agriculture teachers must continue to strengthen their assessment of students' involvement in SAE. The potential impact of SAE can be increased by utilizing these three assessment methods and requiring every student to be actively

engaged in an SAE program. Further, these assessment methods can provide evidence for administration that SAE programs impact student learning, engagement in a total SBAE program, and the development of vital college, career, and life skills.

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Assessing Student Achievement through Inquiry-based Instruction

by Michael Clark

Mr. Clark! Mr. Clark! Mr. Clark! What am I supposed to do? How should I do this? How long does it run? What should I use? What do I do now? Where do I put this? Am I doing this right? I am sure we can all relate to those questions at times in our laboratories. A few years ago, it seemed that I could exhaust a large portion of my laboratory time rotating through groups of students answering such questions during their investigations. Then I was introduced to a teaching strategy called Inquiry. Wow, how that has changed my classroom rigor, classroom management, curriculum delivery, and student assessment/evaluation. Wait, can I put assessment and evaluation together? Shouldn't they be differentiated? According to Webster, they both determine the value of something. The value of what, I ask? Have you not processed the title yet? **STUDENT ACHIEVEMENT THROUGH INQUIRY.**

First, let's understand Inquiry-based Instruction (IBI). IBI utilizes the following five features of classroom inquiry to determine if the learning experience is *teacher or material directed or learner self directed*:

1. Learner engages in scientifically oriented questions,
2. Learner gives priority to evidence in response to questions,
3. Learner formulates explanations from evidence,
4. Learner connects explanations to scientific knowledge,
5. Learner communicates and justifies explanations.

Learner, learner, learner, learner, learner. Do you see the focal point? ***Inquiry in the classroom demands learner engagement, facilitation and communication.*** The chart below lists the five essential features of classroom inquiry and variations to differentiate classroom facilitation as teacher or material directed and learner self directed.

Assessment

No matter what curriculum is taught, we as teachers are accountable for the skills, information, and techniques our students are required to develop in the classroom. So often we maintain the mindset that we are the ones held accountable for learning or lack of learning. IBI allows me to focus the accountability on students first. When we facilitate our classrooms heavily on teacher or material direction, then the accountability and assessment will be from the teacher. If we learn to facilitate our classroom more heavily on learner self-direction, then the accountability and assessment becomes the student's. IBI offers opportunity for both for-

mative and summative assessment, but utilizes formative assessment most frequently.

IBI formative assessment is unique because student progress is evaluated, but from the learner themselves rather than the teacher. Most formative assessment affords the teachers insight to where the learner is and what the plan of action is to assure success for the learner. As discussed earlier through the five features, learner, learner, learner, learner, learner, formative assessment is no exception. A classroom that utilizes IBI allows the learner to develop the ability to check their own progress by engaging in questions, giving priority to evidence, formulating an explanation, connecting, communicating and providing a justification. Please don't misunderstand me; we as teacher are still accountable to the assessment of our learners. Academic rigor is heightened when the learner facilitates the assessment first through investigation, with the teacher provid-



Inquiry in Mechanics: learner engages in question and gives priority to evidence in response to question.

Essential Features of Classroom Inquiry and Their Variations

Less -----Learner Self Direction-----More

FEATURE				
1. Learner engages in scientifically oriented questions	A. Learner engages in question provided by teacher, materials, or other source	B. Learner sharpens or clarifies question provided by teacher, materials, or other source	C. Learner selects among questions, poses new questions	D. Learner poses a question
2. Learner gives priority to evidence in responding to questions	A. Learner given data and told how to analyze	B. Learner given data and asked to analyze	C. Learner directed to collect certain data	D. Learner determines what constitutes evidence and collects it
3. Learner formulate explanations from evidence	A. Learner provided with evidence	B. Learner given possible ways to use evidence to formulate explanation	C. Learner guided in process of formulating explanations from evidence	D. Learner formulates explanation after summarizing evidence
4. Learner connects explanations to scientific knowledge	A. Learner given all connections	B. Learner given possible connections	C. Learner directed toward areas and sources of scientific knowledge	D. Learner independently examines other resources and forms links to explanations
5. Learner communicates and justifies explanations	A. Learner given steps and procedures for communication	B. Learner provided broad guidelines to use to sharpen communication	C. Learner coached in development of communication	D. Learner forms reasonable and logical argument to communicate explanations

More----- Direction from Teacher or Material-----Less

Source: National Research Council. (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC. National Academy Press., P. 2.

ing ultimate formative assessment as a post investigation/experimentation assessment. Students are actively engaged in formative assessment in inquiry based instruction through all subjects in our curriculum ranging from mechanics to Agriscience.

Summative assessment in IBI, on the other hand, is probably more teacher directed than learner directed. Yes, learners can develop an accountability system to evaluate the acquisition of knowledge, but we as teachers should not place such expectations on the learner. Teachers are accountable to the school, state, and globally for the attained skills, knowledge, and techniques the student will utilize to benefit themselves and contrib-

ute to society. We as teachers must place priority on evaluating what was learned through the experience in comparison to a standard or benchmark. SHAME ON YOU as a teacher if you fail to know the standards or benchmarks that your students are accountable to. Teachers are accountable for student accountability. Students and teachers can be actively engaged in summative assessment in inquiry based instruction as a whole through culminating projects or Career Development Events such as the FFA Agriscience Fair.

Assessment Data

What practices can we as teachers utilize to garner the needed data for assessment of student perfor-

mance, furthermore, program performance? Qualitative and quantitative, do these words ring a bell? If you were Pavlov's dogs, you would be salivating by now. How can we gather qualitative and quantitative data for assessment of student and program performance? From rubrics to graphic organizers to science/student notebooks to unit and standardized examinations, there is a multitude of ways to gather such data. Does IBI demand special attention when gathering performance data? Not necessarily, but IBI does require the teacher to segregate themselves from the traditional provision of content material, facilitation of laboratory experimentation and assessment via quiz or test. As a teacher of IBI we have to



assessment on student acquisition of knowledge (quality examples can be found in the EDIS and JAE articles listed in the references). On one standard sheet of paper a student can pose a question, formulate a list of pertinent

Inquiry in Science: learner gives priority to evidence in response to question and formulates an explanation from evidence.

entertain the five essential features of classroom inquiry in our assessment. Was the learner able to pose their own questions? Did the learner determine what constitutes evidence and collect it and to what degree? Could the learner formulate an explanation after summarizing evidence? Was the learner able to independently examine other resources and forms linked to explanations? Did the learner form a reasonable and logical argument to communicate their explanation? (National Research Council, 2000) Dependent on the degree to which a teacher was able to answer the previous questions could constitute the level at which the student would impact/influence their formative and summative assessment.

As Myers and Warner (2006) stated, “Concept maps, Vee maps, and portfolios are alternate forms of assessment that can replace traditional quizzes and tests and can be used to more effectively assess student learning in a lab setting” (p. 1). My tip for you in developing an alternative form of assessment in IBI would be to discover Vee maps. Vee maps are an assessment tool that enables you to provide formative and summative as-

essment on student acquisition of knowledge (quality examples can be found in the EDIS and JAE articles listed in the references). On one standard sheet of paper a student can pose a question, formulate a list of pertinent words, develop a concept map, dictate the necessary events, gather data and draw a conclusion. Further, quality studies have been conducted that provide evidence of the effectiveness of Vee maps in school-based agriscience classrooms (Thoron, & Myers 2010; Thoron, & Rubenstein, 2013). Additionally, I would suggest that you mandate your students utilize a science notebook in your classes. Science notebooks enable your students to document their work and thought processes regarding the educational setting at hand.

Assessing student achievement through IBI requires us to first understand IBI. Once an understanding of IBI is ascertained we must be sensitive to how we utilize formative and summative assessments and still implement the five essential features of classroom inquiry. This may take four to eight weeks (Thoron, 2010), but it is worth it. Finally, we as teachers must research new ways to facilitate assessment in our classroom, whether we try Vee maps or science notebooks, we must embrace current research that provides justification for utilization of such practices.

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Assessing Student Achievement through Classrooms Connected to CDEs and the Agriscience Fair

by Sarah Burleson Sapp and Ashley N. Young

As agriculture teachers we are often looking for practical ways to assess student learning gains. Course standards require that students demonstrate the ability to perform certain tasks within the agriculture field, thus a paper-based test may not adequately assess student learning or allow a student to demonstrate the required task. Therefore, as agriculture teachers we are charged with

learning gain data, and increase involvement in FFA and SAE? Career Development Events and the Agriscience Fair provide ample opportunities within the classroom to assess student learning, provide data, increase FFA involvement, and further develop student Supervised Agriculture Experiences (SAE).

Career Development Events

Career Development Event (CDE) components are beneficial tools to assess the practical component of student learning in the class-

room. To utilize CDE components as assessment tools you should:

3) **Teach curriculum according to set objectives.**

After identifying your objectives, teach the curriculum according to the set objectives. Utilize strategies that are appropriate for the objective and ensure that your teaching will allow a student to be assessed on the objective goals.

4) **Assess students utilizing CDE components and additional assessment tools, if necessary.**

Once the curriculum has been taught according to the set objectives, utilize CDE components to assess student learning. While these components are great assessment tools, you may need to use additional assessments to measure student learning on all objectives.

Examples of using CDE components to assess student learning gains:

- **Soil Science Curriculum**

The Land Class Factors component of the Land Judging CDE is a great tool to assess the following learning objectives: 1) identify soil horizon layers, and 2) analyze soil types using the soil texture triangle. Both of these objectives are tested when analyzing soil pits in the Land Class Factors of the Land Judging CDE.

CDEs and Agriscience Fairs will provide assessment data and increase the total program quality.

developing assessments that can appropriately assess student learning gains based on course standards and objectives. In addition, our accountability for overall student learning is increasing and we are being required to provide data that illustrates student performance within our content area. As agriculture teachers, we all know that there is never enough time in the day to complete everything, let alone implement assessment practices that assess student learning and provide data of student performance. So, why re-invent the wheel? Why not utilize tools we already have to assess student performance? Why not activate the three-circle model through our use of assessment? Why not utilize components of FFA events to help assess student achievement, provide

room. To utilize CDE components as assessment tools you should:

1) **Identify CDEs and CDE components which align with your curriculum.**

To begin you should determine units and curriculum areas in which you are seeking practical assessment tools. Once you have identified these areas, review CDEs and their components to identify those which align with your curriculum. Descriptions of CDE practicums can be found within your state and/or national CDE handbooks.

2) **Develop or match unit/lesson objectives which align with CDE components.**

Review curriculum maps for unit learning goals and objectives that match the CDE components you

- **Livestock Curriculum**

The livestock evaluation CDE can be used to assess learning objectives, such as: 1) categorize animals according to use, type, breed, and scientific classification, 2) illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species, 3) identify commercially important breeds of animals, 4) assemble desirable characteristics of breeding and market animals, and 5) compare and contrast appropriate evaluation criteria for animals, as all of these learning objectives are used when evaluating livestock.

- **Employability Skills Curriculum**

Components of the job interview CDE, such as, completing a job application, developing a resume, and completing phone and personal interviews can be used to assess student learning objectives: 1) identify appropriate work and personal habits, 2) identify and demonstrate positive work behaviors needed to be employable, 3) develop a personal career plan that includes goals, objectives, and strategies, 4) maintain a career portfolio to document knowledge, skills, and experiences, 5) evaluate and compare employment opportunities that match career goals, 6) examine and describe entrepreneurship opportunities as a career planning option, 7) locate, comprehend, and evaluate key elements of oral and written information, and 8) employ computer operations applications to access, create, manage, integrate, and store information.

- **Biotechnology Impact Curriculum**

Components of the Agricultural Issues CDE where students must research and present information about current issues in agriculture can be

utilized to assess objectives: 1) research and report on the major innovators and milestones in the development of biotechnology, 2) identify animal, plant, and environmental applications of biotechnology and the economic impact, 3) assess the future impact biotechnology could have on world population, and 4) identify and discuss emerging technologies in agriculture production (transgenics, biologics, biosecurity, food safety, sustainability, etc.).

These examples are just a few of the countless possibilities of utilizing CDE components as assessment tools in your courses. It is important to remember to use the CDE components as tools to assess student learning in your curriculum, rather than allowing CDEs to drive your instruction. We must remember to use these as a benefit and not to teach CDEs in the classroom. However, a benefit of using these as assessment tools is introducing students to CDEs and gaining participation in your FFA chapter. By using CDE components as assessment tools, students can get excited about participating in practices outside of class time to prepare for CDEs.

Agriscience Fair

Utilizing the agriscience fair as a method of assessing student learning allows instructors to assess standards, increase participation in FFA activi-



A student preparing an Agriscience Fair project.

ties, and allow students to develop or extend their SAE. To utilize the agriscience fair as part of the course curriculum, and an assessment tool:

- 1) **Identify curriculum standards relating to the scientific method and science concepts.**

Utilize your state curriculum standards to identify the standards which relate to the development of an agriscience fair project. Keep in mind that you will be identifying standards related to scientific concepts as well as Common Career Technical Core - Career Ready Practices and standards associated with core subject areas. Examples of agriscience standards are: 1) implement the scientific method and science process skills through the design and completion of an agriscience research project, 2) interpret, analyze and report data, and 3) employ scientific measurement skills. Examples of Common Career Technical Core - Career Ready Practices include: 1) apply appropriate academic and technical skills, 2) communicate clearly, effectively, and with reason, 3) employ valid and reliable research strategies, and 4) utilize critical thinking to make sense of problems and persevere in solving them. Examples of standards related to core subject areas include: 1) cite specific textual evidence to support



Agriscience Fair projects require the development of precise measurement skills.

analysis of science and technical texts, attending to the precise details of explanations or descriptions, 2) translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words, 3) write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results, and 4) develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience, all of which are just a few examples of the standards that align with utilizing agriscience fair research projects within your curriculum.

2) Develop objectives and teach science concepts.

Utilizing the standards that align with your curriculum, it is important to develop objectives to drive assessment of these standards. If your district/state has a curriculum map, you can utilize the objectives developed in the curriculum map to focus instruction and assessment. Be sure

to utilize effective instructional techniques to introduce these science concepts. One way to teach the scientific method would be to utilize a class-wide experiment, where all students participate in developing a hypothesis, following

procedures, collecting data, and developing conclusions.

3) Introduce the Agriscience Fair project and the requirements.

Once students understand all scientific concepts, it is appropriate to introduce the agriscience fair. However, when looking at the agriscience fair project as a whole, the project can seem overwhelming, thus it is important for you to break down the project into components. Develop a rubric that addresses each part of the project (report, experiment, display, presentation, etc.) and utilize the report template provided by National FFA to get students started on their report. Encourage students to select topics related to their SAE or utilize this as an opportunity for students to begin their SAE. Also, be sure to seek advice and instruction from your school librarian if you are uncertain of how to teach online research strategies to your students. Be sure to provide time in class for students to work on their project, ask questions, and receive feedback on their research.

4) Host an Agriscience Fair.

Since the agriscience fair project is being utilized to assess student learning on standards, it is a course

requirement. Since each student will have completed an agriscience fair project, host an agriscience fair at your school. The fair can be utilized to 1) showcase student learning in your program, 2) provide student learning data for your administrators, and 3) help decide which students will compete in the state agriscience fair. This will allow you to encourage student participation in the state agriscience fair based on those that win the school agriscience fair competition.

Although the development and implementation of using CDEs and the agriscience fair in your classroom may seem overwhelming, keep in mind that there are already rubrics available within the CDE handbook and the National Agriscience Fair Handbook. The use of these programs will not only help provide assessment data—which we have to do, but they will also help increase the quality of your total program, by increasing participation in CDEs, the agriscience fair, and the development of SAEs—which we want to do.



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Differentiating Assessment for Students with Special Needs

by R. G. (Tre) Easterly

In backwards design Wiggins and McTighe (1998) explain that instruction should be planned in three stages that occur opposite of conventionally planned instruction. The first stage is identifying the desired result, that is, what do you want the student to be able to do in the real world as a result of the instruction? The second stage is assessment plan, or a plan for how the student will demonstrate that they can perform the desired results. After these two stages have been developed, a plan for students to make meaning of the content can be developed.

When students with special needs are mainstreamed in the agricultural education classroom, it is only natural that differentiating instruction becomes the most immediate need and cause for focus. Differentiated instruction is a way to tailor instruction for all students by considering the diverse needs of all the learners in the class (not just the ones with IEP's and 504 plans) and modify the instruction to provide them with the best opportunity to be successful (Tomlinson, 2001).

Teachers can get the most out of differentiated instruction if they apply backwards design principles to their differentiation. Just as the first step of backwards design is to identify the desired result, it is beneficial to consider what the desired results are for students with special needs. This can come from a conversation with the special-needs caseworkers in the school, other teachers, the principal, parents or by having a conversation with the student. You may be the first

teacher who has asked the student what they plan to do after they graduate or what they hope to get out of a course. According to Roberts and Ball (2009), the goal for agricultural education is to create lifelong learners who are agriculturally literate citizens and create a highly skilled agricultural workforce. After a considering a student's background, it may make more sense for these students to focus

The second stage of backwards design is the assessment plan. Most assessments are developed from behavioral objectives written at varying stages of Bloom's taxonomy. The same should be true for students with special needs. However modifications can, and sometime according to the law should, be modified for the student.

The end goal of agricultural education programs is to prepare students for agriculture careers and to be agriculturally literate.

on specific agriculture career skills for a job the plan to enter after school or maybe the focus for that student should be agricultural literacy so they can make safe and healthy decisions about the food they buy and prepare. The overall goal of school based agricultural education should not change, but the individual student goals can be modified to fit the needs of diverse learners. All students are unique and their educational and career goals should be discussed with the entire IEP team, but typically the career goals for students with special needs can vary. Student's goals can range from attending college (colleges and universities allow for modifications for students as well) to transitioning into a group home after high school. Regardless of their goals, agricultural education can be beneficial to these students.

Teachers have a legal responsibility to follow the IEP plan for assessing students learning. However, the assessment portion of the IEP is usually developed with the state mandated subject area exams in mind. Agricultural education assessments tend to be more diverse in type and administration than subject area tests. For an example, consider the objective, "Install switches, receptacles and light fixtures." For the assessment to match this objective it is reasonable to expect that students will install switches, receptacles and light fixtures as an assessment. For this assessment the modifications of "testing in a separate room" or "reduced answer choices" are not applicable. To appropriately assess students with special needs in agricultural education, the instructor should match the objective to the assessment, then pro-

vide the reasonable accommodation for the student. This article explores a few strategies for modifying assessment for students with special needs in agricultural education courses.

Assessment Chunking

One of the North Carolina Ag Mechanics standards is, "Identify types of fasteners." A typical assessment for that standard would be for students to take an ID test to identify all of the standards on the tool ID list. A student with a learning disability may be able to ID 5-10 at a time. Rather than having that student take the entire test with every fastener included, and most likely get overwhelmed, allow them to study the wood fasteners, the take the test, then study the metal fasteners and take a test on that section. Notice that the learning objective has not been altered in any way and that the assessment matches the learning objective.

Assessment Resources

Another way to modify assessments for student with special needs is to allow them to have study sheets or use their notes on the assessment. This might actually be in the IEP as well. This accommodation can be beneficial in a few ways. First, it can create a felt need for improved note taking strategies. This can provide a great opportunity for teachers to work with students on metacognition skills. The special needs teachers in the school may be able to help. Using notes on an assessment could also be beneficial because it could help students learn to utilize resources that they have available to them in the workforce. For example, you may expect the students in your class to memorize that the bolts on the 5 horse power engine you have been working on in the shop should be torqued to 25 ft/lbs.. For a student with a learning disability it may be difficult for

them to commit that to memory, but it may be a more useful skill for them to be able to look up the number from a technical manual.

Alternative Assessments

The leadership development component is somewhat unique to agricultural education. For students with special needs, especially those with varying forms of autism, it can be difficult to demonstrate some of the leadership traits because of their disability. It is common in introductory courses for students to recite the FFA creed. For some students on the autism spectrum, speaking in front of the class is very difficult and causes a great deal of anxiety. The North Carolina objective associated with this is, "Investigate the significance and meaning of the mission, goals, ceremonies and traditions in organizations such as the National FFA Organization." A student with autism can meet this objective by preparing a presentation about what caused E. M. Tiffany to write the FFA creed or by creating a visual representation of each paragraph of the FFA creed. A student who speaks English as a second language [ESL] may also find it difficult to memorize and understand the FFA creed. Consider allowing students the opportunity to complete assignments in their native language. If a student recites the creed in Spanish (or any other language for that matter) they have been assessed for that objective, albeit in a different language. Alternative assessments can be appropriate for a wide array of objectives and students.

Remember Why We Assess Learners

The key of backwards design is to begin with the end in mind. The point of assessment is to make sure that students are progressing towards the end goal that is set for them. The end

goal for courses in agricultural education is to prepare students for agriculture careers and to prepare them to be agriculturally literate. That goal is the same for every student, regardless of race, color, creed or IEP/504 plan. Properly differentiated assessments can ensure that every student is moving towards that goal.

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The Balloon Dog Scenario: (continued from page 14)

a class is able to finish the laboratory assignment with a reasonable expectation of a grade based on this rubric. Rubrics such as this can and should be provided to students for every laboratory activity.

Safety First

Because of the inherent dangers present within each agricultural laboratory, I cannot emphasize enough the need for a safety exam BEFORE allowing students to enter a laboratory facility. A knowledge-based, paper-and-pencil safety exam can provide several benefits to a teacher. First, it allows teachers to ensure that all students know the safety procedures involved in a specific laboratory setting. Even, and perhaps especially, students who are very comfortable in certain facilities may not be aware or practice all of the safety procedures you expect; students who have used table saws with their parents may not even own a pair of safety goggles and those who have had backyard poultry their entire lives may not know the dangers of salmonella and its transmission methods. In order to ensure all students, regardless of previous

experiences, are entering the lab with the same safety knowledge, a lesson on safety practices and then an exam are crucial. Second, the safety exam can act as a gate-keeper against students not serious about safety. Some students may be behavioral liabilities in the laboratory setting, putting themselves and other students at risk. These students are typically the ones who will not pay close attention or give effort on a safety exam and are therefore less likely to achieve the score needed to enter the laboratory. Teachers have different cut-off points for laboratory entrance; while some allow students receiving an 80% or higher to enter a laboratory, I only allow students earning a 100% to enter a laboratory. Because I don't know which questions a student missed by looking at a score, I cannot discern between a "less-crucial" safety violation (for example, not knowing where a water station is located) and a "more-severe" safety violation (for example, not knowing which tank is oxyacetylene and how much to turn its valve). Therefore, my safety exams only ask about the most crucial safety items and require a 100% to

enter the laboratory. If a student is interested in entering the laboratory, he or she will put forth the effort on the safety exam. If not, I create an alternative classroom-based assignment for students not passing the exam. Finally, the safety exam acts as documentation that you had proof of each student's knowledge of the required safety practices before they entered the laboratory, which will do much to protect your job and reputation in the event of a laboratory accident.

As mentioned previously, agriculture teachers maintain their access to laboratories as a point of pride for their programs. These laboratories not only enable teachers to enjoy a varied and exciting career, but allow them to expose students to a wide variety of learning experiences not offered in any other academic program. Objective rubrics that encourage and evaluate student growth and learning can assist teachers in both ensuring these laboratories are truly locations of enhanced learning, as well as reduce the weight that subjective assessment can put on teachers keeping all those laboratory keys.

Upcoming Themes

September October

Preparing the Next Generation of Leaders

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November December

Utilizing School Laboratories

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Hruska, Amber	March/ April 2014	Yost, Jessica	November/December 2013