Abstract

The Montello School District animal science curriculum needed to be revised in order to meet new educational initiatives set forth by the district and the State of Wisconsin. One major change include aligning course objectives with the Wisconsin Standards for Agriculture, Food, and Natural Resources and Wisconsin Common Core State Standards for Literacy in all Subjects. The focus of this project was to create an 18-week curriculum to prepare Montello students for college and career success that can also be used in other agricultural programs in Wisconsin with an animal science class. A backward design process was used to ensure that learning and assessment activities address all target standards. This curriculum incorporates topics from the animal systems section of the Wisconsin Agriculture, Food, and Natural Resources Standards into six specified units: History and Use of Animals, Animal Handling and Safety, Animal Products, Marketing, and Selection, Animal Nutrition, Animal Reproduction, and Animal Health. Each unit was broken down into performance indicators, essential questions, activities, assessments, and literacy standards. Each unit has two literacy standards identified so that the students are exposed to different literacy strategies throughout the curriculum. The curriculum layout is set up to support a future conversion to standards based grading. Formative and summative assessments included in each unit support student learning and document student mastery of each standard. The standards based curriculum developed through this project teaches students skills that will prepare them for post-secondary education or the workforce and help ensure that each student is successful upon high school graduation.
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Introduction and Literature Review

“If we teach today as we taught yesterday, we rob our children of tomorrow” – John Dewey (Peake, 2010, p.4).

Education is in a realm of change, which makes it ever more important to update and maintain standards based curriculum in each discipline. Among teacher effectiveness programs, new teaching standards, different grading systems, and aiming to incorporate as much reading and writing as possible, state and district curriculum is continually changing. Educators must constantly change practices to help our students think critically, problem solve, and obtain reputable information.

The need for an up to date curriculum aligned to state standards was the driving force in this project. With the release of the updated Wisconsin Standards for Agriculture, Food, and Natural Resources in 2013 and new school district administration, the need to revise curriculum in the Montello district was necessary. The district started a process to re-align all classes to ensure that each unit and daily lesson were based on the appropriate state standards. This project produced a 1-semester (18 week) Animal Science Curriculum that is aligned to the Wisconsin State Agricultural, Food, and Natural Resources Standards and Wisconsin Common Core State Standards for Literacy in all Subjects. The curriculum was also designed to be utilized with standards based grading and contains both formative and summative assessments to document students’ mastery of the identified standards. A secondary purpose of the project was developing a curriculum that could be used by teachers in other Wisconsin school districts.
Purpose

What is the purpose of Agricultural Education in K-12 Education? With all the course offerings and other electives opportunities, it is important to examine why we need agricultural education programs in our school districts. Moore’s study found the following (2004):

Agricultural education is to prepare people for work, to reinforce academic skills, prepare students for higher education, to serve special needs students, to promote agricultural literacy, to promote the development of leisure time, and to provide an alternative for students who do not do well in school. (p.4)

Agricultural education serves many purposes to all different audiences in the school setting. It provides an insight to what agriculture is and how it is relative to a person’s life. There are many career and life skills that can be learned from agricultural education.

Gordon (1999) writes:

Federal support for vocational education began with the Smith-Hughes Act of 1917. Two Democratic lawmakers from Georgia, Senator Hoke Smith and Representative Dudley Mays Hughes, were chiefly responsible for this historic bill, which established vocational education, particularly agricultural education, as a federal program. The act reflected the view of reformers who believed that youth should be prepared for entry-level jobs by learning specific occupational skills in separated vocational schools. (p.3)

The Smith-Hughes Act was the first time that vocational agriculture was supported at the federal level. There was a recognized need for students graduating secondary education to have skills to continue into the work field and perform different jobs. This legislation, along with
others, paved the way for our current Career and Technical Education programs in secondary school settings. Today, we see the same need for skills in the workplace. Business owners need skilled workers with baseline knowledge to perform the entry level tasks they are expecting. There is also a need for entrepreneurs in our current society, and our students have the ability to begin their own business once they graduate. If agricultural education programs can produce students with entry level skills, they will be able to understand industry terms and be focused on learning additional skills.

The Montello School District is currently a public charter school striving to meet new educational goals and initiatives. The district goals focus on four main areas; to produce community based, project based, and learner centered curriculum to ensure our students are college and career ready. Agricultural education teachers are already accustomed to producing career ready students by using hands-on curriculum and learning through real life application tied to the agricultural industry. The technical content needed to be successful in agriculture related careers is spelled out in the Wisconsin Standards for Agriculture, Food, and Natural Resources (2013). These standards include seven pathways: Agribusiness Systems; Animal Systems; Environmental Service Systems; Food Products and Processing Systems; Natural Resources Systems; Plant Systems; Power, Structural, and Technical Systems. The animal systems pathway was utilized for this project to provide students with the knowledge and skills needed for college and career success in agriculture and related occupations.

In addition to the standards, Bloom’s Taxonomy was utilized to ensure all levels thinking are addressed with an emphasis on higher order thinking skills. The formative assessments throughout the unit will allow the teacher to monitor the students’ understanding and progress. If
they need additional supports, scaffolding will be provided to help aid their understanding by using a different source or modifying assignments. Summative assessments document the degree to which students have met each objective and corresponding standard.

In today’s educational reform, the teacher must not act as the gatekeeper of knowledge, but guide the students to their own learning and understanding. Educators must create classroom environments where students learn how to solve problems, think critically, and communicate effectively. The curriculum developed through this project will support agricultural education teachers as they prepare students for the workforce and post-secondary education.

Background Information on Design

A district literature circle chose Jeff Zwiers and Marie Crawford’s book, *Academic Conversations*. It is a great resource when planning new curriculum. The book outlines a need for the conversations that take place in our day-to-day classroom to be relevant and realistic in order to apply to students’ lives. If the learner is not connecting to the learning, they will be mentally removed from the learning situation and take minimal information away from the situation. If the student can engage in the lesson and connect the topic to prior learning, the likelihood of them retaining the information is greater.

There are many different styles of developing curriculum. This animal science course was modeled after Grant Wiggins and Jay McTighe’s book, *The Understanding by Design Guide to Creating High-Quality Units*. Wiggins & McTighe (2011) present many instructional modules on the basic concepts and elements of the Understanding by Design, or the “backwards design” approach to creating curriculum.
The Wisconsin Agriculture, Food, and Natural Resources Animal Systems standards focus around six distinguished ideas that were broken into units; History and Use of Animals; Animal Handling and Safety; Animal Nutrition, Animal Reproduction; Animal Health; and Animal Products, Selection, and Marketing. Each unit covers one to two standards and aligns to the Wisconsin Agriculture, Food, and Natural Resources Animal Systems performance indicators. Units also include the literacy goals outlined in the Wisconsin Common Core State Standards for Literacy in all Subjects to help students develop the reading, writing, speaking, and listening needed for college and career success.

Each unit in the new curriculum has clear objectives, activities, and assessments. This will be a working document and more activities will be added as needed. With the possibility of the Montello School District migrating to standards-based grading, the curriculum developed through this project can be easily used to grade each performance indicator. According to Scriffiny (2008), “If your grading system doesn’t guide students toward excellence, it’s time for something completely different” (p.70). Standards-based grading allows teachers to assess the knowledge and skill of the student, whereas traditional grading sometimes assesses behaviors. Scriffiny goes on to point out the seven reasons for standards based grading: “Grades should have meaning, We need to challenge the status quo, We can control grading practices, Standards-based grading reduces meaningless paperwork, It helps teachers adjust instruction, It teaches what quality looks like, and It’s a Launchpad to other reforms” (p.70-74). This curriculum was not designed to be assessed as standards-based grading, but the format of the layout would provide an easy conversion to such a process if a district or teacher would deem it necessary.
A suggested timeline for the class is included to provide structure and serve as an outline for each unit. The timeline is a guide for learning, with the understanding that sometimes student interest or questions may lengthen or shorten a unit. Student voice and choice should be noted and used whenever possible to allow them to take additional interest in their learning.

**Methods**

There are many designs and methods to creating curriculum. The first step in the process was to read different publications that discussed curriculum planning ideas and philosophies. The Montello School Districts’ curriculum director highly recommended, *The Understanding by Design Guide to Creating High-Quality Units* by Grant Wiggins and Jay McTighe. The backwards design process described in the book gives designing curriculum a new perspective. Wiggins and McTighe (2011) explain backwards design as follows:

> We want understanding by design as opposed to understanding by good fortune; that is, we don’t want to just throw content and activities at the wall and hope something sticks. We need to think of unit design work as the intellectual equivalent of a GPS device in our car: by identifying a specific learning destination first, we are able to see the instructional path most likely to get us there. (p. 7)

Planning and developing curriculum is crucial to the learning outcomes of students. If curriculum and lessons are not planned out and aligned to standards, it is more difficult to develop the scope and sequence of each unit. The Unit by Design Template is a tool that guides backward design and focuses a unit plan on the goal of understanding as opposed to “coverage”
or activities. Backwards design is a way of thinking; it is not about filling in boxes in a template (Wiggins & McTighe, 2011, p. 13).

In addition to curriculum being structured for learning and comprehension, it incorporates disciplinary literacy in each unit. The Wisconsin Department of Public Instruction has many different resources on incorporating disciplinary literacy into the career and technical education classrooms. According to Association for Career & Technical Education (2009):

In today’s ever-changing global economy, "literacy" describes a broad range of skills necessary for individual success in various aspects of education, careers and life. At its most fundamental level, literacy represents the ability to read, write and communicate—the ability to understand and use language to achieve one’s goals. Literacy is a prerequisite to learning in all other subjects, especially as students are exposed to increasingly diverse and intricate texts from which they need to glean knowledge. Unfortunately, too many adolescents lack the literacy skills necessary to navigate the reading and writing requirements of high school and the future world in which they will work and live. While educators around the country are seeking ways to address this challenge, career and technical education (CTE) programs are stepping up to offer students a rigorous and relevant education rich in literacy content and strategies. CTE courses, often overlooked in academic discussions, can have a tremendous impact on students’ literacy engagement and achievement, and must be considered as part of the adolescent literacy solution. (p. 1)

Students in high school often ask, “When will I ever use this in the real world?” Agricultural Education is a means to show students the application of math, science, and English.
For the animal science curriculum, each unit incorporates aspects from multiple disciplines. Students are able to use the core subject information in the areas that they excel in and apply it to learning about animals. It helps the students understand the importance of math when they are using it to figure out the cut scores of judging cattle, balancing feed rations, and using equations for feed efficiency. In the math classroom it may just appear as a problem on paper. In real life application it is your production bottom dollar, which suddenly becomes much more important and valuable to some students and allows them to make the connection.

The Montello School District efforts to promote disciplinary literacy include a Personal Learning Community (PLC) that focuses on how to incorporate disciplinary literacy into each class. This group recommended different resources containing literacy strategies. The literacy strategies utilized in this curriculum were identified by using these resources and working with different texts. These efforts also increased district-wide awareness of the agriculture curriculum and how it helps to reinforce the content taught in other classrooms.

The following Wisconsin Common Core State Standards for Literacy in all Subjects (2011) are addressed throughout the units in the curriculum:

1. Write arguments focused on discipline-specific content.
2. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
3. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
4. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

5. Write arguments focused on discipline-specific content.

6. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

7. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

8. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

9. Integrate multiple sources of information presented in diverse formats and media (e.g. visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

10. Write an argument focused on discipline-specific content. (p. 61-73)

The incorporation of literacy activities in this curriculum will help the students meet both agriculture and literacy standards. Reading and writing strategies used throughout the curriculum will allow students to be exposed to a variety of ways to help them succeed in high school and beyond.
Results

This curriculum project was created for Montello Jr/Sr High, but can also be adapted for any high school setting teaches animal science. The curriculum includes Wisconsin Agriculture, Food, and Natural Resource standards, performance indicators, objectives, activities, and assessment ideas for an 18-week semester. Teachers in other schools can easily modify these items as needed to address their students’ needs.

The history and use of animals is taught in the beginning so students have an idea of where the common domesticated animals descended from. This provides background on each animal’s initial use, so they can compare it to the current use of the animal. Using hands on activities in the classroom helps students learn. By teaching students to understand the safety techniques about being around animals they will recognize how to be safe in future animal contact instances throughout the semester. That unit is followed by animal handling and safety. Nutrition, reproduction, health, and products/selection/marketing are the remaining units that can be taught in sequence or rearranged based on personal preferences. The curriculum structure below shows the unit title and the Wisconsin Agricultural, Food, and Natural Resource standard in parentheses. The timeline is indicated to give an approximate structure to the person planning to use the curriculum. Performance indicators taken from the Wisconsin State Agricultural, Food, and Natural Resources Standards are listed for each unit.

Animal Science Curriculum Outline
Hannah Wolsdorf- Montello Jr/Sr High

1. History and Use of Animals (AS1, AS2) 2 weeks
2. Animal Handling and Safety (AS6, AS7) 4 weeks
3. Animal Products, Marketing, and Selection (AS2) 4 weeks
4. Animal Nutrition (AS4) 2 weeks
5. Animal Reproduction (AS5) 3 weeks
6. Animal Health (AS3) 2 weeks

1. History and Use of Animals (AS1, AS2) - 2 weeks
   - AS1.a.5.h: Evaluate and describe characteristics of animals that developed in response to the animals’ environment and lead to their domestication
   - AS1.a.6.h Outline the development of the animal industry and the resulting products, services and careers.
   - AS2.a.7.h: Appraise and evaluate the economic value of animals for various applications in the agriculture industry

2. Animal Handling and Safety (AS6, AS7) - 4 weeks
   - AS6.a.4.h: Outline safety procedures for working with animals by species
   - AS6.a.5.h: Design programs that assure the welfare of animals and prevent abuse or mistreatment
   - AS6.a.6.h: Interpret animal behaviors and execute protocols for safe handling of animals
   - AS6.b.4.h Discuss consumer concerns with animal production practices relative to human health
   - AS6.b.5.h: Explain why animal trace back capability, using individual animal and farm identification systems, is important to producers and consumers.
   - AS7.a.4h Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility.
   - AS7.a.5.h Design and animal facility, focusing on animal requirement, efficiency, safety and ease of handling.
   - AS7.a.6.h Explain how modern equipment and handling facilities enhance the safe and economic production of animals.
   - AS7.a.7.h Select equipment and implement animal handling procedures and improvements to enhance production efficiency.

3. Animal Products, Marketing, and Selection (AS2) - 4 weeks
   - AS2.a.4.h Explain how animals are classified using Linnaeus’s taxonomical classification system
   - AS2.a.5.h Compare and contrast the hierarchical classification of the major agricultural animal species
- AS2.a.6.h Classify animals according to the taxonomical classification system

-AS2.b.6.h Compare and contrast animal cells, tissues organs and body systems and describe their functions

-AS2.b.7.h Detail the processes and application of meiosis and mitosis in animal growth, development, health and reproduction

-AS2.b.8.h Explain the relationship, importance and uses of animal tissues to growth, performance and health in the agricultural industry

-AS2.b.12.h Explain the impact of animal body systems on health, growth and reproduction

-AS2.c.4.h Compare and contrast desirable anatomical and physiological characteristics of animals within and between species

-AS2.c.7.h. Develop efficient procedures to produce consistently high quality animals, well suited for their intended purpose

4. Animal Nutrition (AS4) - 2 weeks

- AS4.a.4.h: Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition

-AS4.a.6.h: Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs

-Discuss how feed additives and growth promotants are administered and the precautions that should be taken

5. Animal Reproduction (AS5) - 3 weeks

-AS5.a.3.h Describe the functions of major organs in the male and female reproductive systems

-AS5.b.3.h Evaluate and select animals for reproductive readiness

-AS5.c.3.h: Evaluate reproductive problems that occur in animals

-AS5.d.3.h Explain the advantages of using genetically superior animals in the production of animals and animal products

-AS5.f.6.h Explain the process of natural and artificial breeding methods

-AS5.f.8.h Select animals based on quantitative breeding values for specific characteristics

6. Animal Health (AS3) - 2 weeks

- AS3.b.4.h: Explain the health risk of zoonotic diseases to humans and their historical significance and future implications

- AS3.b.6.h: Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry
Organizing the curriculum in this format of the big design allows for teaching each unit with the big goal in mind; whether you’re a producer or not, how will livestock production affect my life? Today’s agricultural education classes are faced with a minority of the class being producers and the majority being consumers. Not everyone will grow up and own beef, sheep, poultry, or swine; however everyone will have some connection with these animals regardless of hearing about them on the news or consuming the products that come from them. It is the job of the educator to provide the students with opportunities to examine the industry and make their own conclusions on the products they purchase.

The benefit of this curriculum is that each unit incorporates least two Wisconsin Common Core State Standards for Literacy in all Subjects. Infusing two different standards in each unit ensures that each unit covers multiple forms of literacy. Students are exposed to different reading, writing, and comprehension methods throughout the semester.

Any writing done throughout the course will be assessed by the Montello District English Department Rubric. This rubric is used throughout the 9-12 classrooms to ensure students are familiar with expectations and have the chance to work on their writing skills in each discipline. The rubric follows the CERC writing format. This includes writing a claim, providing evidence, giving reasoning, and having a solid conclusion in every paragraph that our students are writing. By providing the same formats in every classroom, the students know what to expect and will hopefully perform better on their writing assessments.
Discussion & Summary

John Dewey couldn’t have been more correct upon his statement, “If we teach today as we taught yesterday, we rob our children of tomorrow” (Peake, 2010, p.4). Curriculum revision will need to continue in order to keep preparing students for college and career success. As an educator, maintaining a classroom with up-to-date standards is a good checkpoint to ensure you are meeting statewide expectations. The curriculum developed through this project supports students in achieving the learning called for in the state academic standards for agriculture, food and natural resources and in literacy.

A struggle of beginning teachers in agricultural education is having many different classes to teach at the same time. It is difficult to effectively plan six different classes each day teaching the material set forth by a district and state. This curriculum is a good tool to keep an educator on track with teaching to the standards. It also gives a great starting point for new educators to help them jumpstart their teaching career or allows veteran teachers to enhance their current curriculum.

During this curriculum project I have learned a lot about myself as an educator and the need to change my teaching style to meet the needs of standards and students. Students need an interactive curriculum that teaches them about how animal production impacts their daily life and what it means to raise and care for animals each day. I want them to leave with an appreciation for the industry and knowledge to be informed consumers. This curriculum will allow me to follow our state standards while allowing the students to participate in activities to enhance their literacy skills to make them ready for secondary education and the work force.
References


Peake, J. (2010, November 1). If We Teach Today As We Taught Yesterday, We Rob Our Children of Tomorrow. *Agricultural Education Magazine*, 83(3) Pages 4-5.


