

**STEAM Agriscience Curriculum: Preparing the Next Generation of Agricultural
Researchers Through Inquiry Based Learning**

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Introduction

Science, technology, engineering, agriculture, and mathematics (STEAM) education plays a critical role in preparing students for careers that require problem solving, innovation, and analytical thinking. Inquiry-based instruction has been shown to improve student engagement, scientific thinking, and problem-solving skills within school-based agricultural education (Wells et al., 2015). However, research indicates that agricultural educators value inquiry-based instruction but often require structured resources and support to effectively implement STEAM concepts in the classroom (Nelson et al., 2022). To address this need, STEAM Agriscience curriculum was developed by the Texas State University Department of Agricultural Sciences and funded by USDA NIFA (Grant 2021-77040-34881). The curriculum was designed to help high school agricultural educators incorporate science, technology, engineering, agriculture, and mathematics into their classrooms through inquiry-based instruction and agricultural research activities. By providing easy access to lessons, instructional materials, videos, and hands-on experiments, the curriculum supports teachers in creating engaging learning experiences that develop critical thinking, communication, and research skills.

Curriculum Structure

The STEAM Agriscience curriculum consists of five lessons designed to guide students through the research process while integrating agricultural applications. Structured curriculum materials help educators incorporate scientific inquiry into agricultural classrooms while reducing lesson preparation demands (Nelson et al., 2022). Each lesson includes pre-recorded lecture videos, downloadable PowerPoint presentations, student notes, homework assignments, teacher notes, and hands-on classroom activities or experiments. Students that participate in inquiry-based agricultural instruction report increased engagement and improved understanding of course content (Baldock & Murphrey, 2020). The curriculum is designed to be flexible, allowing teachers to implement lessons individually or as a complete unit.

How it Works

The curriculum was designed with teacher accessibility and classroom implementation in mind. Educators can access all instructional resources through the STEAM AG-ED website, located on the Texas State University Department of Agricultural Sciences website. There is where materials are organized by lesson topic including lecture materials and supporting resources that reduce preparation time for teachers while promoting active student engagement. Teachers may choose to follow the curriculum structure as designed or adapt the materials to fit their instructional style and classroom schedule. Hands-on experiments and inquiry-based activities allow students to apply STEAM concepts to real-world agricultural scenarios while developing collaboration, communication, and problem-solving skills.

Table 1.

Overview of STEAM Agriscience Curriculum Lessons

Lesson	Topic	Description
Lesson 1	Research 101	

		Introduces students to scientific inquiry, the scientific method, types of research, and credible sources.
Lesson 2	Developing Your Research Project	Focuses on research design, data collection methods, and quantitative and qualitative research concepts.
Lesson 3	Analyzing and Preparing a Research Report	Guides students through organizing data, interpreting results, and creating research reports.
Lesson 4	Ethics and Integrity in Research	Explores ethical research practices, academic integrity, plagiarism, and research misconduct.
Lesson 5	Research Poster Development	Teaches students how to design and present professional research posters using visual communication techniques.

Results to Date

The STEAM Agriscience curriculum has been shared with agricultural educators, student teachers, and university faculty through presentations, workshops, and instructional demonstrations. Early feedback from educators indicates that the curriculum helps simplify STEAM integration by providing organized, classroom ready materials that can be immediately implemented. The access to pre-recorded lecture videos, editable instructional slides, and detailed teacher notes has been especially beneficial for beginning teachers and educators with limited experience teaching research concepts. The flexibility of the curriculum allows teachers to adapt lessons to a variety of agricultural education courses and student ability levels.

Future Plans

Future plans for the STEAM Agriscience curriculum include expanding lesson topics, increasing the number of classroom experiments and research activities, and continuing outreach efforts through conferences, workshops, and teacher preparation programs. Some future goals include gathering educator feedback to improve lesson implementation and developing more resources that support inquiry based agricultural education. There are also plans to continue presenting the curriculum at professional conferences and collaborating with agricultural educators to strengthen STEAM instruction in secondary agricultural classrooms.

Costs

One major advantage of the STEAM Agriscience curriculum is accessibility. All curriculum materials are provided free of charge through the STEAM AG-ED website. Because lessons include ready-to-use instructional resources, teachers can implement activities with minimal preparation and limited additional costs. Many experiments and classroom activities can also be adapted using materials commonly available in agricultural science classrooms.

References

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