**Science communication: Context-specific reusable learning modules for strengthening students' communications skills**

**Introduction**

A strong need to train scientists to be effective communicators is evident across the food, agriculture, natural resources, and human (FANH) sciences. In the 2016 American Association for Agricultural Education research agenda, Roberts et al. (2016) highlighted gaps between industry expectations and skills of young scientists. One gap of specific concern in the 2016 AAAE research agenda was the gap in communications skills and expectations. To close identified gaps while meeting workforce needs, Crawford et al. recommended collaboration between industry professionals and faculty as they also identified communications as the most important communications skill in a 2011 report. Their collaboration is fundamental to teaching communications skills with an industry perspective on sciences.

To address this gap, we designed communications curricula in the form of reusable learning modules (RLMs) focused on seven communications areas identified in the Crawford et al. (2011) report—listening effectively, communicating accurately and concisely, communicating orally, communicating pleasantly and professionally, communicating in writing, asking effective questions, and communicating appropriately and professionally using social media. We wrote the communications curricula to supplement technical content taught in junior- and senior-level agricultural science courses.

**Procedure**

Driven by real-world issues influencing the agricultural industry, the RLMs can be used in online, face-to-face, and hybrid learning environments and as standalone units or supplements to existing curricula. Each module utilizes a variety of teaching tools, assessments, and worksheets to help students effectively translate technical knowledge and understanding in scientific contexts. Instructors can choose to use one or all of the RLMs as each one is unique and independent of each other. Each RLM includes a link to a student worksheet and PDF handouts for students to download or print prior to engaging in the lesson.

The RLMs provide context-specific examples and activities related to animal, plant, and poultry sciences and include audio, video, and text exercises with reflection and rigorous, relevant student assessments to gauge student learning and understanding of

the communications content. The RLMs are "Sharable Content Object Reference Model" (SCORM) compliant and can be uploaded into most online learning management systems (LMS). To access the curricula, which includes learning outcomes, instructional modules, assessments (summative and formative), student resources, and a faculty facilitation guide, instructors should visit the Texas A&M University Libraries online materials repository. To access the materials, search for "science communications" at the Faculty Teaching Materials section of the Library (https://oaktrust.library.tamu.edu/handle/1969.1/187505). Please note that answer keys are purposefully separated from the curriculum in a faculty-only area. Individuals must contact the library digital repository to obtain answer keys (https://oaktrust.library.tamu.edu/contact).

Example Module

As an example, one RLM focuses on development of students' written communications skills. In the RLM, students learn to think critically as they use their scientific, translational, and media writing skills to translate technical knowledge. To gain student buy-in, the introduction provides research context and statements explaining the value of mastering effective written communications skills. The RLM contains four learning outcomes:

- Develop talking points about a complex agricultural issue;

- Display personal writing identity using a personal persona;

- Explain the positives and negatives of a complex agricultural issue; and

- Translate the science of a complex, agricultural issue into an easy-to-read infographic.

One writing exercise in the RLM requires students to select a topic to research based on their discipline or interest area. Students, then, must think critically about the content discovered through their research, evaluate information to share with a lay audience, and create an infographic in a brief, visually-appealing, and easy-to-consume format. Additional writing exercises include developing an audience persona; writing lead paragraphs for hard news; highlighting soft news characteristics; writing basic social media—Facebook, Twitter, and Instagram—posts about hot topics in agriculture; and outlining a reflective writing strategy to break-down science-focused topics for lay audiences.

**Assessment**

We have conducted usability testing on the RLMs, including reviews from undergraduate students, graduate students, context-specific faculty, and industry professionals. After reviewing the RLMs, students expressed they appreciated the content as they explained the need for additional communications training. Students

noted the hands-on, learner-centered content was highly functional and engaging. Faculty members explained they used the RLMs to relieve the burden of designing curricula with the goal of enhancing students' communications skills through applied activities and assessments. Faculty members also valued the incorporation of Peerceptiv (i.e., a peer review tool that reduces teaching burden associated with writing assignments) into the RLMs, stating that it added rigor and decreased grading time. Additionally, faculty members also reported they were user-friendly and easy to load in their LMS. Industry professionals stated the RLMs align with their communications skill standards and suggested using the RLMs as professional development for new hires.

## Discussion

When selecting which of the seven RLMs to use, instructors should consider learning outcomes, course and student expectations, types of activities needed, and course timelines. Although the RLMs are designed for agricultural science courses, they can be used in other courses. Most scientific, technological, engineering, and mathematics fields require some level of translation when communicating important topics to lay audiences. The communications unit, consisting of seven modules, is designed to help students become effective communicators by addressing skills necessary to facilitate scientific conversations and prepare a more efficient workforce.

We developed curricula as part of a funded project through the United States Department of Agriculture National Institute for Food and Agriculture Higher Education Challenge program and in consultation with animal, plant, and poultry science faculty and agricultural industry advisers (Texas A&M University Libraries, n.d.).

## References

Crawford, P., Lang, S., Fink, W., Dalton, R., & Fielitz, L. (2011). Comparative analysis of soft skills: What is important for new graduates? Association of Public and Land-Grant Universities. http://www.aplu.org/

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016–2020. Department of Agricultural Education and Communication, University of Florida.

Texas A&M University Libraries. (n.d.). Strengthening communication skills of agricultural students: Using real-world examples to meet industry employment needs. Faculty Teaching Materials. https://oaktrust.library.tamu.edu/handle/1969.1/187505

**Submitted by:**
Shannon Norris
Texas A&M University
College Station, TX 77843

Holli R. Leggette
Texas A&M University
College Station, TX 77843

Theresa Pesl Murphrey
Texas A&M University
College Station, TX 77843

Audra Richburg
Texas A&M University
College Station, TX 77843

McKenna Bush
Texas A&M University
College Station, TX 77843