AC 2012-5205: INTERACTIVE FUNDAMENTAL AGRICULTURAL RESOURCE MATERIALS (IFARM)

Ms. Pil-Won On, University of Missouri, Columbia

Pil-Won On is Instructional Designer/E-learning Specialist, College of Engineering, University of Missouri, Columbia. On has a M.S. in instructional systems technology from Indiana University, Bloomington.

Prof. Lori Unruh Snyder, Purdue University

Lori Unruh Snyder is an Assistant Professor in the Department of Agronomy. Her research focus is teaching technologies and sustainable international grassland systems.

interactive Fundamental Agricultural Resource Materials (iFARM)

Background

A few academic programs in applied agricultural disciplines have incorporated critical thinking into their curriculum. Even though it is challenging to stimulate interests in the subject matters for information-driven introductory courses, our experience has shown that it is indispensable to improve a critical-thinking skill of undergraduate agricultural students. However, innovative approaches that foster learner's critical thinking in agricultural engineering education are rarely found in practice.

Developing well-designed learning materials improves both teaching and learning in an online environment[1]. In addition, rich media would help overcome the students' physical distance from a classroom[2]. According to the study of Howard, Ellis, and Rasmussen[3] who conducted pre/post-tests to find out the significance in learning with multimedia, the effective use of multimedia improves students' performance. As Stemler[7] stated, learning with multimedia "becomes active, not passive, and it ensures that users are doing, not simply watching." The dual coding approach [5] supports the effectiveness of the interactive multimedia delivery that enables contextual concepts to be visualized with auditory aids[6]. Kolodner[4] also addressed analogous scenarios promote deep learning by giving learners an opportunity to apply conceptual understanding in real world situations.

Design and Development of iFARM

iFARM (interactive Fundamental Agricultural Resource Modules) is web-based interactive modules that demonstrate ways to deal with complex agronomical problems. It focuses on achieving two pedagogical objectives:

- *Scientific Principles*: Demonstrations of scientific methods will be utilized in order for students to identify problems, formulate hypothesis tests, conduct and analyze data and derive conclusions
- *Critical Thinking*: Students will be exposed to complex problems based on evidence-based information throughout each module.

The 13 main topics that cover fundamentals in agronomy including calibration, crop region, germination, IPM, plant breeding, precision farming, reproduction, residues, roots, seeds, soil, stems & leaves, and weather were deliberated in the iFARM modules.

Figure 1. Screenshot of Calibration

Figure 2. Screenshot of Crop Region

Figure 3. Screenshot of Germination

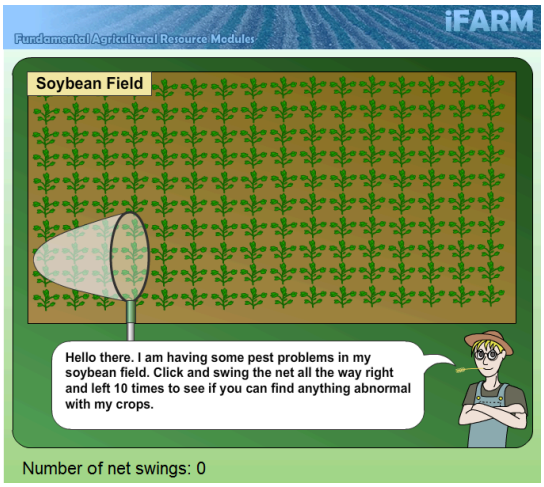

Figure 4. Screenshot of IPM

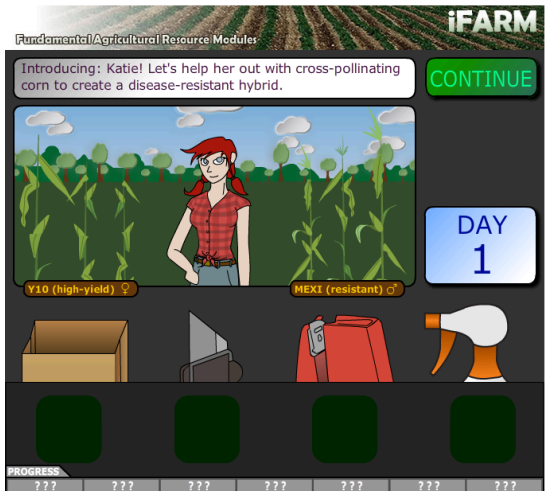

Figure 5. Screenshot of Plant Breeding

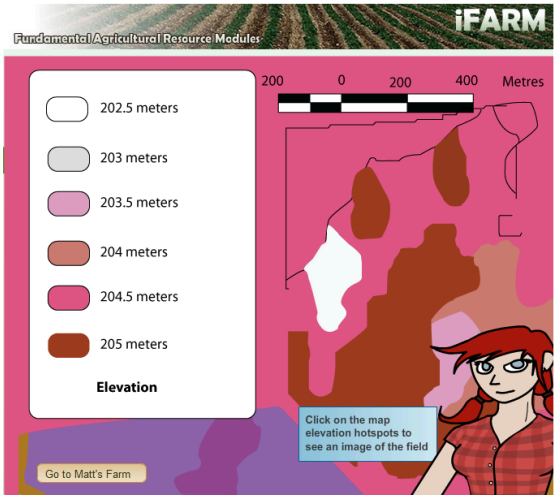

Figure 6. Screenshot of Precision Farming

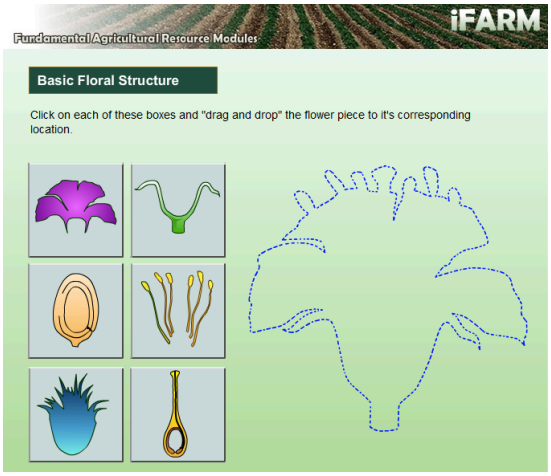

Figure 7. Screenshot of Reproduction

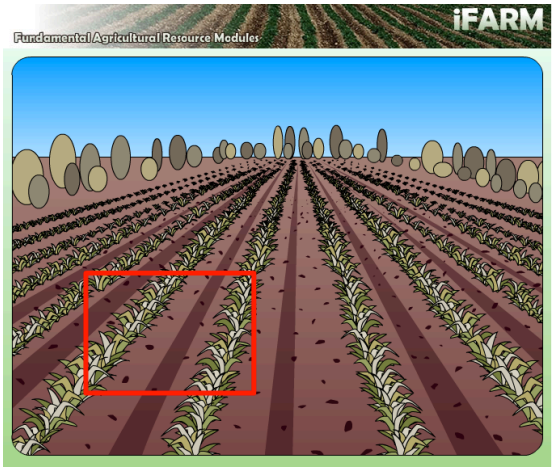

Figure 8. Screenshot of Residues

Figure 9. Screenshot of Roots

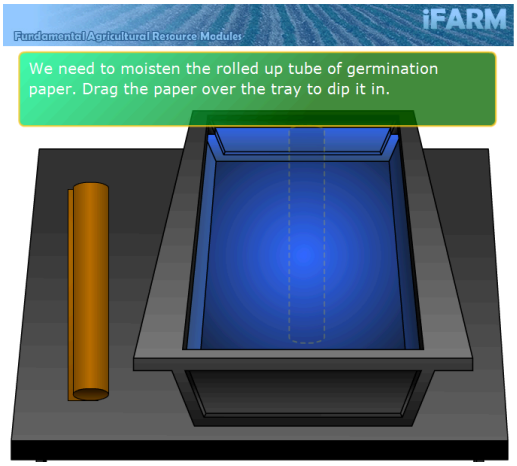

Figure 10. Screenshot of Seeds

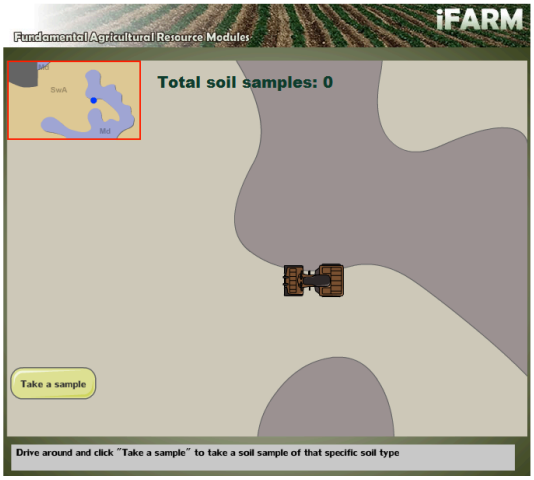

Figure 11. Screenshot of Soil

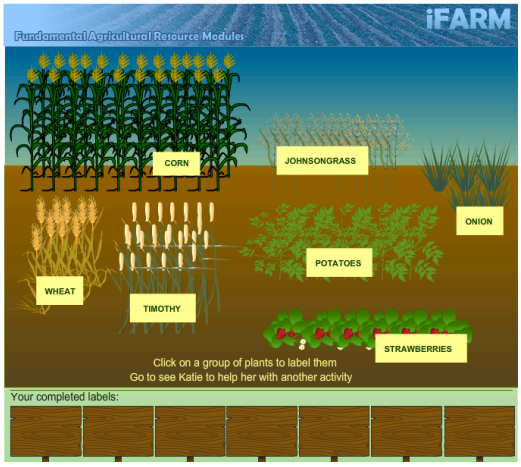

Figure 12. Screenshot of Stems & Leaves

Figure 13. Screenshot of Weather

As shown in Figure 1 through 13, the iFARM modules are conveyed in the interactive multimedia format with certain scenarios corresponding to the designated topics. It is intended for learners to achieve the desired learning goals by direct experiment and active participation devised in the learning process. In each module, learners are facing the situation presuming that they serve as a consultant who is hired to solve the agronomical problems placed in a certain context. The fictional characters, Matt and Katie, are the clients who request consulting to deal with serious problems in their farms. The learning process is designed to be close to a field trip experience that students in an introductory agronomy course commonly schedule to participate during a face-to-face class as part of the coursework. It is common that a field trip activity is conducted by passive observation. iFARM, on the other hands, gives students an opportunity to actively engage in their learning and employ their critical-thinking skill for solving the given problems. At the end of each module, students submit a complete report to their clients which template is provided at the beginning of each module.

Lessons Learned

The authors wanted to assure that the interactive learning activities through iFARM modules promote students' learning experiences. According to the students' comments from the course evaluation that has been conducted at the end of every semester starting from the Fall 2008 semester, students seemed positive about their learning with iFARM. Even though some students commented that some modules seemed childish, overall comments about their learning experience through iFARM were encouraging consistently over the course of past semesters.

The instructional resources in agricultural engineering education that demonstrate critical-thinking practices are rarely found. The innovate application that advance students' learning experience is still a challenge. This study hopefully suggests best practices of designing and developing interactive learning resources that help students learn better in more practical matters.

References

1. Carpi, A. (2003). The Vision Learning Project. *Journal of College Science Teaching, 33*(1), 12-15.
2. Dennis, A. R. & Kinney, S. T. (1998). Testing Media Richness Theory in the New Media: The Effects of Cues, Feedback, and Task Equivocality. *Information Systems Research, 9*(3), 256-274.
3. Howard, W.G., Ellis, H.H., & Rasmussen, K. (2004). From the Arcade to the Classroom: Capitalizing on Students' Sensory Rich Media Preferences in Disciplined-Based Learning. *College Student Journal, 38*(3), 431-440.
4. Kolodner, J. L. (1997). Educational Implications of Analogy: A View from Case-Based Reasoning. *American Psychologist, 52*, 57–66.
5. Paivio, A. (1990). *Mental Representations: A Dual Coding Approach* (2nd ed.). New York, NY: Oxford University Press.
6. Rieber, L. P. (1996). Animation as Feedback in a Computer-Based Simulation: Representation Matters. *Educational Technology Research & Development, 44*(1), 5-22.
7. Stemler, L.K. (1997). Educational Characteristics of Multimedia: A Literature Review. *Journal of Educational Multimedia and hypermedia, 6*(3/4), 339-359.