PROGRESS REPORT: Pre-collegiate Youth Outreach and Urban STEM –

Developing and Structuring Pre-Collegiate STEM Education and Outreach Using Pest Management (IPM) Education as a Model and Partnering with Black Hawk County for piloting ISU K-12 Outreach Mechanisms.

Objectives
To support partnerships and collaborations within ISU and with stakeholders to enable faculty and staff to provide a quality chain of educational experiences for youth; minimize risks and liability to ISU; grow youth programming within colleges and departments, increase exposure to ISU; raise career aspirations of youth through the programs delivered; develop policies for ISU faculty, staff, and students to vet new volunteers; and work directly with children while complying with child protection standards. One component of the objective is to develop an integrated learning iBook that allows students to explore curriculum content through a construct of interactive narratives and then work with Black Hawk County to pilot and give feedback. Lessons from the process will be shared with ISU faculty and staff interested in K-12 outreach.

Funding Awarded $516,595

Funding Expended to Date $68352.25

Progress to Date
The use of Integrated Pest Management (IPM) can help farmers obtain higher yields and increase profits. IPM is a set of multidisciplinary tools, assembling information from a variety of disciplines and emphasizing thorough recordkeeping and field scouting. IPM utilizes both preventive and curative tactics to manage disease, insects, and weeds. It is important to lay a foundation of IPM knowledge in future farmers and agronomists. Teaching technologies are changing, such as the development of interactive, electronic textbooks (i.e., iBook Author by Apple). The use of new learning technology, such as iBooks, by University Extension can help us to stay relevant as we work to educate the next generation on the role of IPM in crop production.

The Crop Scouting iBook is an interactive text describing the basics of IPM, crop scouting, and introductory entomology, plant pathology, and weed science. Developed in conjunction with the Virtual Reality Applications Center (VRAC) on campus, it utilizes iBook Author to meld information and interactivity including text, videos, illustrations, images, quizzes, and other agricultural-specific activities such as yield estimations, pest identification, determining aphid counts on leaves, etc. The book is comprised of 6 chapters and an Appendix. Chapters consist of:

1. Introduction to Integrated Pest Management
2. Crop Growth and Development
3. Entomology: Introduction to Insects
4. Plant Pathology: Introduction to Plant Disease
5. Weeds
6. Crop Injury
Though incomplete, the main portion of the Crop Scouting iBook is functional containing nearly all of the text, images, and illustrations. A few videos are embedded, but we are looking to replace these with higher quality/more relevant videos. Review questions for chapters have been written and several of the interactive components are in development. Over the past year, development has progressed through a rewrite/restructuring of the initial text to expand the covered information and several smaller rounds of edits between the writers and developer. We are considering contracting the development of activities within the iBook.

The Memorandum of Agreement with Black Hawk County and Waterloo School District was signed and in place August 2013. Prior to the MOA being in place Black Hawk County and Waterloo School District moved forward on the local Initiative components. A STEM club was started January 2013. The club provided STEM learning experiences and was supported by matching funds from Waterloo Schools and Black Hawk County Extension as well as in-kind support from area partners. The club focused on engineering, agronomy, and water quality supported by ISU and local partners.

Two summer camps were held for middle school students. The camps met from 8am until 3pm, Monday through Friday. Robotics Camp featured daily challenges with students first learning how to deconstruct and reconstruct a Vex robot. After reconstructing the robot, students had to program the robot to complete a daily challenge. For example, in one scenario students had to remove a “toxic waste” container from the robot field in order to avoid contaminating the “city”. If the robot dropped the container and it tipped, the city was contaminated (these scenarios were all fictional – no actual toxic substances were used). Eight students participated in this camp. Virtual Reality Education Pathfinders (VREP) Camp was also held for middle school students. The VREP program is one that uses free software called Blender to teach 3-D modeling and animation. Our school district will be implementing VREP programs at Carver and Hoover middle schools during the 2013-2014 school year. Students and staff from both schools participated in this camp. Student trainers from the VREP program were on hand three mornings throughout the week to lead students and staff through some of the preliminary work with the Blender software. The remaining camp was devoted to individual student projects. Students were given free rein to produce creative projects. Students were able to create interactive games, animated volcanoes, a melting snowman, logos with moving parts, and more! Representatives from our local John Deere Product Engineering Center visited our camp to ask students about their projects. Twenty-four students participated in this camp.

Next Steps
The original contact at VRAC has left the university to start a business. The plan was for VRAC to develop the main parts of the iBook and outsource the activities and evaluation components. While the main structure of the iBook is nearly complete, we have yet to start on the activities and evaluation metrics. We are unsure of the intention of VRAC to outsource these parts of the development of the iBook.

The existing Extension equivalent of this iBook is the ISU Scout School, which occurs as a 1-day traditional event a Saturday in March. We planned to have this iBook complete and in the hands of participants of this school to compare learning preferences and effectiveness of the two teaching methods. At the current pace, we will not be able to do this comparison in 2014 but we hope to once the iBook is complete.
The Black Hawk County component of the grant has now acquired the iPads for using with learning materials developed at ISU. The iBook developed at ISU and a learning game focused on sustainability will continue to be developed and iterations piloted and revised based on feedback. Using these developed tools professional development for ISU faculty and staff and the K-12 will be explored and designed for summer and fall 2014. The professional development components will be explored with ISU Center for Excellence in Learning and Teaching and School of Education faculty.

Strengthening ties with ISU is ongoing with trips to ISU campus for Waterloo students are planned. A December trip will link 4th graders doing research on mussels with campus researcher and 5th graders and high school students will engage with ISU faculty and staff in learning experiences. Admissions will also meet with the students to help them see the possibility of their future including ISU.

Support for an emerging local Waterloo science fair will be implemented winter/spring of 2014.