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Mobile Applications for Extension

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Abstract: *Mobile computing devices (smart phones, tablets, etc.) are rapidly becoming the dominant means of communication worldwide and are increasingly being used for scientific investigation. This technology can further our Extension mission by increasing our power for data collection, information dissemination, and informed decision-making. Mobile computing applications (apps) with relevance for Extension can be divided loosely into three categories—information delivery, collaborative research/participatory sensing, and self-assessment. Examples can be found in all Extension fields of inquiry, from agricultural production, pest management, natural resources management to youth science literacy and managing nutrition and fitness.*

This article is part 1 in a series on the use of mobile computing applications for Extension work. Upcoming articles will discuss mobile applications for participatory science and tools to develop and use mobile applications for Extension.

Reaching Extension Audiences Through Mobile Computing

Mobile/cellular (cell) phones are rapidly becoming the dominant means of electronic communication worldwide (SSI Knowledgewatch, 2012). As of Dec. 2011, there were over 330 million wireless connections in the United States, representing 106% of the nation's population (CTIA The Wireless Association, 2012). The Pew Research

Institute estimated that by May 2011, 83% of American adults owned a cell phone and 51% used their phones to readily access information (Smith, 2011). Almost half of mobile phone subscribers in the U.S. own smart phones with built in computing power and access to the internet (Nielsen, 2012). It is estimated that by 2015, accessing the Internet via a mobile device will be more common than using a traditional desk-top computer, and providing information via mobile devices is now a priority for the U.S. government (White House, 2012).

People now expect to access information and education using mobile computing devices (smart phones, tablets, etc.), and this includes Extension clientele (LaBelle, 2011). For example, in a recent survey of farmers, 94% of respondents had a cell phone, and over 70% said they access agriculture-related information and services on their phone (Walter, 2011). The case for using mobile technologies is even more apparent for audiences for whom Extension programs seek to expand their penetration. Groups that have traditionally been on the other side of the "digital divide" such as minorities, young adults, and those with low household incomes are more likely to use smart phones as their main source of internet access (Zickuhr & Smith, 2012). As a whole, however, Extension programs have been resistant to embracing new technologies (Diem, Hino, Martin, & Meisenbach, 2011).

Mobile computing devices are increasingly used for scientific investigation (Nature Methods, 2010) and for delivering scientific information. Mobile devices allow users such as landowners, growers, students, trained volunteers, and the general public to contribute and analyze data and provide a sense of investment in scientific research and monitoring. This technology can further the Extension mission by increasing power for data collection, information dissemination, and informed decision-making. These tools can: be applied to issues such as environmental monitoring and evaluation (Connors, Lei, & Kelly, 2011) to increase public and decision-maker understanding of land change and to help landowners conserve biodiversity; allow for early detection of invasive pests; disseminate science-based information to growers about new technologies and marketing methods; identify ways to conserve water and improve water quality; and increase scientific literacy.

A Typology of Mobile Applications

Mobile computing applications (apps) with relevance for Extension can be divided loosely into three categories—information delivery, where information developed at the university is made available to end users; collaborative research, where the user collects data that is shared with researchers and/or other participants in the study;

and self-assessment tools that guide user collection of data that are not shared but rather used in a decision-support tool to provide tailored recommendations.

Information Delivery

For information delivery, mobile devices offer the ability to access information where and when users need it—for example, a grower or pest control advisor can look up an identification guide for soy pests while in the field using the *North Plains Integrated Pest Management Guide* app from South Dakota State University Extension. For the general public, there is the opportunity to provide information where and when they are interested in getting it. Apps may be more engaging and interactive than print materials, even holding the attention of youth clientele such as the *We Grow It—Do You Know It* game app from University of Nebraska Extension. On the down side, mobile app users may or may not invest the same amount of time and concentration to information delivered in this way.

Data Collection

Mobile devices have numerous advantages for data collection. There are obvious benefits in terms of workload and efficiency to using digital methods as the primary mode for entering data. When field data are collected by pencil and paper then manually entered into a computer database, errors can occur in both the recording and entry processes. Where volunteers collect data in the field then submit it later through email or a web site, loss of information can occur through fatigue or error as observers forget dates, times, and locations, and may or may not make accurate identifications. Mobile technologies can address several of these problems.

Mobile computing devices automatically collect date and time information. Most mobile computing devices incorporate a global positioning system allowing for the automatic collection of location data when an observation is noted—even without the satellite-linked GPS feature enabled, devices operating on cellular networks can triangulate location though not to the same accuracy. Data entry can be constrained to reduce errors as well—for example, users might choose from an extensive checklist of species likely to be found at their present location based on known distributions or recent observations. Most mobile computing devices also contain a camera, allowing photographic information to support user observations, such as species identification. Because date, time, and location are automatically obtained, the likelihood of erroneous entries is greatly reduced and participants' time is conserved reducing fatigue. Back-end costs need to include data management, review, and quality control.

Self Assessment

The sophisticated *Turfgrass Management* app from University of Georgia Extension (McCullough, Waltz Jr, Hudson, & Martinez-Espinoza, 2011), guides for the preparation and application of chemical controls, and the Grazing Records app from South Dakota Extension are examples of apps that collect data not to share, but to guide user decision making. Self assessment applications are common in the human resources field for identifying and tracking activities to improve nutrition and fitness. They have also been applied to the home environment, for example, in helping homeowners identify opportunities to conserve water using the commercially developed *Drip Detector* app.

Regardless of the topic, format, or mode of use, mobile applications are quickly becoming a key way in which people in all fields access information resources and utilize decision support tools.

More information about the apps mentioned in this article can be found at

http://ucanr.org/sites/ANR_Apps/.

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