Should smartphones be used to facilitate a new approach to agronomy education?

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Background

- Ease and instant access to information with smartphone
- Commonplace of smartphone in social and business venues
- Student expectations regarding use smartphones in their careers
- Impact of smartphones on the learning process
Call to Action

• Prompted by two surveys in spring 2015
  – Curriculum review survey of all agronomy juniors and seniors
  – Introductory Crop Science class survey
• 190 undergraduate students
In regards to your career in agriculture, which of the options do you think you will use to answer a question you do not know the answer to in the future?

<table>
<thead>
<tr>
<th>Option</th>
<th>Rating*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone with internet access</td>
<td>3.46</td>
</tr>
<tr>
<td>Phone an expert</td>
<td>3.18</td>
</tr>
<tr>
<td>Smartphone with applications for the given topic</td>
<td>3.10</td>
</tr>
<tr>
<td>Extension publications</td>
<td>2.96</td>
</tr>
<tr>
<td>Answer by saying, “I don’t know and will get back to you”</td>
<td>2.79</td>
</tr>
<tr>
<td>Notes from college classes</td>
<td>2.60</td>
</tr>
</tbody>
</table>

*4=definitely will  3=probably will  2=probably will not  1=definitely will not
Agronomy Juniors and Seniors S15

• Nearly half indicated that if posed a question when working as a consultant, they would source information from a device rather than from past understanding.

• 70% indicated that the application of smartphones should be a part of curriculum and knowledge assessment.
If smartphones were incorporated into Crop Science class, where would the most student success be achieved?

<table>
<thead>
<tr>
<th>Rating*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.41</td>
<td>In corresponding during group projects</td>
</tr>
<tr>
<td>3.05</td>
<td>Quick reference during discussion in lecture</td>
</tr>
<tr>
<td>2.78</td>
<td>In laboratory</td>
</tr>
<tr>
<td>2.78</td>
<td>For additional reading assignments</td>
</tr>
<tr>
<td>2.32</td>
<td>On exams</td>
</tr>
<tr>
<td>2.10</td>
<td>Smartphones should not be used in Crop Science</td>
</tr>
</tbody>
</table>

*4=strongly agree  3=agree   2=disagree  1=strongly disagree
Summary of Preliminary Surveys

- Students **plan** on using smartphones in their careers
- Students think smartphones **have a place** in the classroom
Objectives of Study

1) Evaluate how access to electronic media influences students’ approach to learning

2) Understand students’ expectations for using electronic devices in their education and future careers

3) Introduce and assess the use of smartphone facilitated assignments in Crop Science class
Methods

• Trial run fall 2015 (F15)
  – Introductory Crop Science
  – 138 students
  – 4 credit course (3 hrs lecture, 2 hrs lab)
  – 98.5% have smartphone

• Full implementation spring 2016 (S16)
  – 71 students
  – 100% have smartphone
Methods

• Trial run F15
  – Develop extra credit assignments designed to engage smartphone photo and app use
  – Assess effectiveness through survey

• Full implementation S16
  – Positive reinforcement with grades
  – Assess methods and student impressions through survey
Introductory Crop Science F15

• Smartphone activation and application activity
  – Three part extra credit program
  – Photos from botany lab experiences
  – App discovery and implementation

• Calibration apps lab experience
  – Facilitated during normal calibration lab
  – Three apps utilized in multiple field scenarios
Botany Lab Photos

Sunflower Growth Stages

The “R” Stages in the growth stages of a sunflower are the Reproductive Stages. The reproductive stages range from “R1” to “R9”. In these stages there is a bud that forms, expands and grows. Up to “R4” the bud is expanding and growing. “R5” is the stage of flowering. This stage is divided into different decimals in accordance to the area of the head showing. After “R5” the flowering is done and the flower begins wilting.
Pictured is a soybean with the two cotyledons split apart. Easily visible on the left cotyledon is the plumule, hypocotyl, and the radicle. The plumule contains the first true leaves. The hypocotyl will grow to push the cotyledons up towards the surface. And the radicle will become the main root.
This is a picture of a flower of a plant cut in half without the petals and sepals. In this picture, the filament and anther are easily seen. The style and stigma are easily seen as well as the larger center piece. At the base, you can see the ovary and the peduncle that supports the flower.
Botany Lab Photos

• Benefits
  – Point of discussion in class
  – Active engagement in the dissection activity
  – Facilitated quiz preparation
  – Reinforced concepts in write-ups
This App is a plant identification App. The user must take a picture of the flowering structure of a plant and then the picture goes through a database to I.D. it. This plant is Sunn Hemp, and with the use of this App, it confirmed the species and then gave me background information on it such as scientific name and growing season.
App Discovery and Implementation
App Discovery and Implementation
App Discovery and Implementation
App Discovery and Implementation

• Benefits
  – Active learning
  – Forced students to leave the classroom
  – Engaged the power of observation
  – Set basis for lab calibration exercise
Lab Calibration Exercise

• Learning outcomes
  – Practice drill and planter calibration
  – Measure and determine harvest loss
  – Estimate grain yield

• Reinforce app concepts
  – Nothing more than unit cancellation
  – Critical to understand background of app
Lab Calibration Exercise

**Background**

**Objectives**

**Methods**

**Conclusions**

**Soybean Yield Calculator**

First Free App for Android to Estimate Yields in Soybeans

**Step 1:**
Install the app from Google Play. It is FREE!

**Step 2:**
Estimate plant population. Use should be in plants per acre. Count the number of plants in 21-inch row length for 30” row spacing (31.5” row for narrow rows).

**Step 3:**
Select 10 representative plants from the same area and count the total number of pods per plant. Zero rows will not be considered for yield estimation.

**Step 4:**
Make an estimate of the number of seed per pod. This parameter ranges from 1 to 4 (average of 2.5 seeds per pod).

**Step 5:**
According to the actual crop condition and the weather forecast, estimate the final seed size. Seed size ranges from 2500 to 3500 seeds/lbf for good and poor conditions, respectively, during grain filling.

**Step 6:**
Get Yield!
Lab Calibration Exercise
Lab Calibration Exercise

• Survey data one week after experience
  – Almost 90% of students felt **encouraged to use** agronomy apps in the future
  – More than half indicated that apps discouraged the need for an understanding of unit cancelation
  – More than half also indicated that it was **important** for Crop Science to continue an emphasis on unit cancelation
Implementation in S16

• 30 point series of assignments implemented
  – Botany lab photos (5 pts)
  – Smartphone internet search assignments (10 pts)
  – App discovery and implementation (10 pts)
  – Lab calibration app exercise (5 pts participation)

• 4% of total course grade
## TEVAL Course Evaluation

<table>
<thead>
<tr>
<th>How valuable were the smartphone assignments?</th>
<th>Percent response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Worthless - drop them</td>
<td>2.4</td>
</tr>
<tr>
<td>2 = Not Very Valuable</td>
<td>7.1</td>
</tr>
<tr>
<td>3 = Somewhat Valuable</td>
<td>14.3</td>
</tr>
<tr>
<td>4 = Valuable</td>
<td>22.6</td>
</tr>
<tr>
<td>5 = Highly Valuable - keep them</td>
<td>53.6</td>
</tr>
</tbody>
</table>
Other Evaluation Highlights

• Very positive feedback from students
  – Facilitated better test preparation
  – Real-world application
  – Brought “fun” into the classroom
  – Very positive grades

• Issues
  – Some students did not engage
  – Not all at same level of technology expertise
Where Are We Going?

• Illustrates the need to expand and integrate into other courses
• Demonstrates that the classroom needs to be current
• Reflect ever changing needs of agriculture
• Understanding student motivation
Aspects for Future Research

• Refine and reinforce current smartphone classroom activities

• Utilize the scholarship of teaching and learning to facilitate improvement and adoption of smartphone education

• Encourage colleagues to consider similar programs in their curriculum
Questions or Comments?

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