*Journal of Agricultural Education, 59(1), 238-254*
*https://doi.org/10.5032/jae.2018.01238*

# Is There an App for That?: Describing Smartphone Availability and Educational Technology Adoption Level of Louisiana School-Based Agricultural Educators

H. Eric Smith[1], Kristin S. Stair[2], J. Joey Blackburn[3] & Madelyn Easley[4]

**Abstract**

*The purpose of this study was to describe smartphone availability and usage for teaching by agricultural educators in Louisiana. Further, this study sought to describe the level of educational technology adoption of these teachers. Data were collected at each Louisiana FFA Leadership Camp session during the summer of 2016. Teachers were asked to indicate the availability of smartphones for instructional purposes at their school. Teachers also indicated instructional technologies they are using currently, as well as their self-perceived level of adoption of educational technology. Over half of the teachers indicated their district policy allowed teachers to employ smartphones for educational purposes. Less than one-third of the teachers were in districts that allowed students to use smartphones for learning. The classroom computer and digital projector were the most commonly utilized educational technologies. The highest percentage of teachers perceived themselves as letting others adopt technologies before they are willing to try. The results of this study are in line with the Diffusions of Innovations theory in terms of percentages of teachers in the adopter categories. It is recommended that teacher professional development opportunities be developed following the model of teacher change to ensure agriculture teachers receive up-to-date information to further their practice.*

**Keywords:** technology, smartphone availability, technology adoption, agricultural education teachers

## Introduction

Technology is often emphasized as being a critical component of both educational reform and classroom innovation (Palak & Walls, 2009). As a result, considerable resources are allocated each year by local school districts to purchase technology and provide teacher training. In fact, public education spent approximately three billion dollars on digital content for teachers to utilize in their programs in 2015 (Herold, 2016). As a result of these increased resources, teachers and

---

[1] Eric Smith is the Executive Director of the Louisiana FFA Association. 244 John M. Parker Coliseum, Baton Rouge, LA 70803.
[2] Kristin S. Stair is an Associate Professor of Agricultural Education in the Department of Agricultural and Extension Education and Evaluation at Louisiana State University, 135 Knapp Hall, 110 LSU Union Square, Baton Rouge, LA 70803, kstair@lsu.edu
[3] J. Joey Blackburn is an Assistant Professor of Agricultural Education in the Department of Agricultural and Extension Education and Evaluation at Louisiana State University, 129 J.C. Miller Hall, 110 LSU Union Square, Baton Rouge, LA 70803, jjblackburn@lsu.edu
[4] Madelyn Easley is an undergraduate student in the Department of Agricultural and Extension Education and Evaluation at Louisiana State University, 137 JC Miller Hall, 110 LSU Union Square, Baton Rouge, LA 70803, measle6@lsu.edu

students are experiencing more opportunities for technology integration (Cuban, Kirkpatrick, & Peck, 2001).

In modern classrooms, computers are commonplace, with 98% of schools having one or more in the classroom and 84% having high-speed Internet connections (Statisticbrain, 2015). Investigations into how schools acquire technology are not new, in 2009 the average student to computer ratio was 3:1. This was true even in school systems with fewer resources (Gray, Thomas & Lewis, 2010). While the availability of technology is ever increasing, individual teachers may not integrate at the same rate. Many factors may contribute to a lack of technology integration. Specifically, issues such as (a) a lack of support, (b) a lack of technical access, (c) student issues, (d) technical problems, and (e) teacher attitude can all impact a teacher's willingness to integrate technology into the classroom (Wood, Mueller, Willoughby, Specht & Deyuoung, 2005). Hew and Brush (2007) conducted a meta-analysis of 48 empirical studies to determine what teachers at all levels perceived as the greatest barriers to technology integration. From these studies, three main barriers were established: (a) resources, (b) teachers knowledge and skills and (c) teachers attitudes and beliefs. In a study of agricultural education teachers in North Carolina, some of the greatest barriers to technology integration in the classroom were (a) the cost of technologies, (b) implementation issues, and (c) time needed to develop lessons to incorporate technology (Williams, Warner, Flowers & Croom, 2009). Additionally, some teachers are simply unsure of how to employ educational technologies to enhance their pedagogy (Murphrey, Miller, & Roberts, 2009)

Ertmer (1999) described barriers to technology integration as being hierarchical in nature; first order barriers include availability and teacher knowledge, while second order barriers are defined as intrinsic factors such as teacher beliefs. While the availability of technology is critical to incorporation, a teacher's willingness to include the technology within the classroom is often the determinant of a teachers' practice (Ertmer, 1999; 2005). Similarly, Palak and Walls (2009) found that teachers who already have ready access to resources, materials, training, and are comfortable with technology may still choose not to implement that technology in their classroom. The study concluded that teacher attitudes towards technology do not necessarily change because of the availability of technology (Palak & Walls, 2009).

An added variable in the technology integration issue is that even when available, teachers may not necessarily apply that technology in student-centered classroom instruction. For many teachers, technology is used to supplement current teaching practices or for administrative purposes (Palak & Walls, 2009). A study conducted by Broekhuizen (2016) found 52.7% of teachers who have readily available access to technology showed no evidence of employing technology to allow students to gather, evaluate, or apply information toward learning. Further, only 36.7% of teachers implemented technology that allowed students to solve problems or create original works and only 35.4% used technology for collaborative learning (Broekhuizen, 2016). Similar results have been reported across various educational levels and programs. For example, a study of faculty members in social work programs at land-grant universities revealed that professors most often integrated educational technology at low levels, and primarily used technology such as email, internet, and course management systems (Buquoi, McClure, Kotrlik, Machtemes, & Bunch, 2013).

Similarly, previous studies in agricultural education have found teachers most regularly use technology that is teacher focused rather than student focused. In a 2003 study, the most commonly utilized technologies reported by Louisiana agricultural education teachers were interactive DVDs or CDs, digital cameras, video/CD/DVD players, laser disc players or standalone DVD or CD players (Kotrlik & Redmann, 2009). A more recent study in Tennessee found the most frequently used technologies were personal desktop computers, digital projectors, laptops, and cellular phones (Coley, Warner, Stair, Flowers, & Croom, 2015). Additionally, Williams et al.

(2014) found 65% of North Carolina teachers utilized projectors, as well as a teacher computer on a daily basis. These technologies all indicate a trend toward using technology to present information passively.

Passive uses of educational technologies are not always what is envisioned when teachers are asked to incorporate technology to reach students in today's classroom. Blaire (2012) called for a re-envisioning of how educational technology is utilized, specifically, the learners of today are capable of engaging through technology at a very different level than students in the past and that the classroom simply having an interactive whiteboard is no longer sufficient (Blaire, 2012). This push toward innovation may be intimidating as teachers work to acquire and make resources available to students, then implement them in their lessons (Schrum, 1999).

The incorporation of technologies into the learning process is not a new phenomenon (Whisenhunt, Blackburn, & Ramsey, 2010). For example, Reiser (2001) noted the invention of lantern slides in the early 1900s sparked the movement to incorporate visual images to improve learning. Instructional technology has evolved to the present day where computers, interactive whiteboards, and digital projectors are the norm (Whisenhunt et al., 2010). The secondary students of today are labeled *digital natives* and have been surrounded by technology for most, if not all, of their lives (Prensky, 2001). Effectively incorporating educational technologies into instruction is one means of increasing motivation and interest of digital native students (Heafner, 2004). Further, technology rich environments have been shown to influence teacher attitudes and increase student engagement, achievement, motivation to learn in all content areas, and technology integration has been identified as a characteristic of effective agricultural educators (Bialo & Sivin-Kachala, 1996; Christensen, 2002; Peake, Briers, & Murphy, 2005; Roberts & Dyer, 2004). Further, Murphrey et al. (2009) concluded that some agriculture teachers perceived educational technologies as being beneficial and complementary to their teaching. As technology continues to advance, teachers should look for new and innovative means for incorporating it into instruction to improve their practice. One such advancement in technology that holds potential for increasing student achievement, motivation, and/or engagement is the smartphone.

The computing capabilities of current smartphones far exceed that of the mobile phones from just a decade ago (Traxler, 2009). A modern smartphone has more processing capability than NASA had in 1969 when Neil Armstrong became the first person to set foot on the moon (Kaku, 2011). Despite the continued upward trend in computing power, approximately 69% of schools in America ban cellular phones from campus (Commonsense Media, 2010). These widespread bans on smartphones in schools has been attributed to what Thomas and O'Bannon (2015) called the *new digital divide* where students, millennial teachers, and non-millennial teachers and administration have conflicting perceptions of how smartphones could or should be incorporated into the learning process. Further, research has shown that student perceptions of utilizing smartphones for learning tend to be more positive than the perceptions of teachers (Kalinic, Arsovski, Stefanovic, Arovski, & Rankovic, 2011; Tindell & Bohlander, 2011; Thomas & O'Bannon, 2015; Berry & Westfall, 2015).

The all-encompassing connectivity of smartphones allows students to learn ubiquitously (Traxler, 2009), while allowing teachers to customize instruction (Steel, 2012). Bridging this digital divide could allow both parties to work together more efficiently (Corbeil & Valdes-Corbeil, 2007). However, similar to previous studies of other educational technologies, smartphones are often not used to their full potential. Basic functions such as calculator, Internet access, calendar, and clock are used more often than cutting-edge functions that enable students to create material (Thomas & Muñoz, 2016). Similar to presentation and collaboration technology, the more sophisticated uses of smartphones may improve student achievement (Liu, Scordino, Renata, Navarrete, Yujung, & Lim, 2015) and motivation (Su & Cheng 2015) when compared to traditional teaching methods.

Various concerns arise when teachers consider the allowance of smartphones in the classroom (Thomas & O'Bannon, 2015). A survey of 675 college students from 26 states revealed that on average students spent about 20% of class time using smart devices for purposes unrelated to class (McCoy, 2013). Further, texting during class is linked students to 30% lower scores on quizzes (Froese et al., 2012). However, sending and receiving Tweets related to material being taught has resulted in gains of understanding between 10% and 17% (Kuznekoff, Munz, & Titsworth, 2015).

Other concerns that have contributed to the banning of smartphones in the classroom include (a) cheating, (b) sexting, and (c) cyberbullying (Keengwe, Schnellert, & Jonas, 2014). Cheating is a major concern among teachers and students (Thomas & Muñoz, 2016; Thomas & O'Bannon, 2015; Tindell & Bohlander, 2011). A CommonSense Media (2010) poll indicated 35% of students have used their phone to cheat. Sexting refers to the sending of inappropriate photos and sexually suggestive content via text message (Obringer & Coffey, 2007). According to Lenhart (2009), 4% of young people aged 12-17 have sent sexually explicit material via text and 15% have received sexually explicit text messages. Cyberbullying is threatening harm or attempting to shame a fellow student on social networks or other type of internet forum. Most cyberbullying is initiated off-campus, but results in disruptions on-campus. This has sparked debate to expand the jurisdiction of school punishment and some schools have begun incorporating off campus behavior policies into their handbooks (Keengwe et al., 2014).

Technology integration is not as simple as technology acquisition; added factors play into teachers actively using technology in their program. Often teachers are intimidated or anxious about incorporating educational technology into their classrooms (Redmann, Kotrlik, & Douglas, 2003). Further, teachers may not be engaging in the most appropriate professional development opportunities to learn to incorporate educational technologies into their pedagogy effectively. Murphy and Terry (1998) concluded that the time necessary to become proficient at incorporating educational technologies in to the agriculture classroom could be a barrier to the adoption of these tools into the classroom.

While some teachers seek professional development opportunities such as workshops or conferences to increase their knowledge of educational technologies, many teachers are self-taught (Kotrlik & Redmann, 2009; Kotrlik, Redmann, Harrison, & Handley, 2009; Redmann et al., 2003). Due to the ever-changing nature of technologies available to educators, research must be conducted periodically to assess how teachers are incorporating these technologies into the educational process (Thomas, Adams, Mcghani, & Smith, 2002). It is imperative that those individuals charged with providing professional development – teacher educators, state instructional staff, and local school districts, have the most up-to-date information regarding teachers' classroom practices. Further, it is crucial that these individuals design and implement professional development opportunities through methods that have been shown to influence teacher behavior in the classroom.

## Theoretical Frame

The theoretical underpinning that guided this study was Roger's (2003) Diffusion of Innovations theory. The premise of the theory is that for diffusion of a technology to occur, the potential adopters must perceive certain attributes of the innovation. These attributes include (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability (Rogers, 2003). Specifically, relative advantage refers to the perception of how much better the innovation is than the idea it will replace. Compatibility is how well the innovation fits within the potential adopters' current situation, while complexity is the perception of the level of difficulty of the innovation. Trialability is the "degree to which an innovation may be experimented with on a limited basis" (p. 16). Finally, observability is how visible the results of the innovation are to others. Rogers (2003) noted that innovations that are perceived as low in complexity and high in the remaining categories are likely to be adopted at a more rapid rate than those perceived as complex.

Rogers (2003) also discussed categories of potential adopters. These categories include (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. Rogers (2003) compared the categories of adopters in a given system to the bell curve to show their relative relationship. Innovators comprised of 2.5% of a system and are described as venturesome, those who push boundaries of the current paradigm to create new and different ideas. Early adopters make up 13.5% of the population in a system and are those who are likely considered to be opinion leaders within their social circle, meaning others are likely to seek the advice of the early adopter before adopting a new innovation (Rogers, 2003). The early majority comprises 34% of the individuals in the system and are characterized as being deliberate in their adoption of an innovation. This group tends to let the kinks of an innovation get worked out before they adopt (Rogers, 2003). The late majority comprises the next 34% and are labeled as skeptical. This group normally holds out on adopting an innovation until the pressure of their social system causes them to give in and adopt (Rogers, 2003). The final 16% are known as laggards who are characterized as being traditional. They are the most isolated individual or group within their social system and are highly suspicion of change agents and innovators. Laggards may choose not to adopt for a variety of reasons, ranging from resource availability to the perception of the innovation interfering with their values (Rogers, 2003).

## Conceptual Framework

Conceptually, this study was framed by Guskey's (2002) model of teacher change. This model can help explain the discrepancy between teacher technology availability and technology use. According to Guskey (2002), teachers must first be trained in any professional development initiative before implementing change in their classrooms. Once a change is integrated into practice, there must be an opportunity for teachers to see a change in student learning. Teacher attitudes and beliefs will only change when a practice has been implemented and they have the opportunity to study the impact of the initiative further. Resources may be provided in programs, but as described by Kotrlik & Redmann (2009) the majority (92%) of agriculture teachers are self-taught, therefore there is little pressure (or support) from school systems when implementing change.

Existing research on instructional technology integration into secondary agricultural education has focused on adoption, sources of training, accessibility/usage and perceived barriers (Coley et al., 2014; Kotrlik & Redmann, 2009; Kotrlik et al., 2009; Redmann et al., 2003; Williams et al., 2014). However, as technology has rapidly evolved and has become increasingly more mobile, so too have teachers' needs changed. In order to better understand the technology availability and integration opportunities available to teachers, more recent research is needed.

The purpose of this research aligns with the AAAE National Research Agenda, specifically Research Priority Areas (RPA) 2 and 4. Specifically, RPA 2 is New Technologies, Practices, and Products Adoption Decisions (Lindner, Rodriguez, Strong, Jones, & Layfield, 2016), while RPA 4 is Meaningful, Engaged Learning in All Environments (Edgar, Retallick, & Jones, 2016).

## Purpose and Objectives

The two-fold purpose of this study was to describe the smartphone availability and usage by agriculture teachers in Louisiana for educational purposes and to describe the level of educational technology adoption of these teachers. The following research objectives guided this study:

1. Describe smartphone availability (i.e., physical access and district policy) of Louisiana agricultural education programs (i.e., teachers and students).
2. Describe Louisiana agricultural educators openness to utilizing smartphone technology for teaching and learning
3. Identify educational technologies that Louisiana agricultural educators incorporate into instruction
4. Describe Louisiana agricultural educators self-perceived level of educational technology adoption.

## Methods

Data collected for this study was part of a larger research project to determine differences in achievement of students in a technology enhanced curriculum versus those taught via direct instruction. The target population of this study was all Louisiana agricultural educators actively working during the 2015-2016 academic year (N = 238). The Louisiana agriculture teacher directory obtained from the Louisiana FFA website was used to determine the target population. Data were collected, face-to-face via hardcopy instrument by the researcher at each of the three Louisiana FFA Leadership Camp sessions. Per state legislative policy, all agriculture teachers employed on a 12-month contract must attend state FFA camp and bring at least two active FFA members. After registering for camp, a meeting for teachers is held in the conference area. During this meeting, an informed consent statement was read aloud by the researcher and the teachers were allowed time to voluntarily complete the survey. In all, 177 advisors registered for camp and 157 agriculture teachers completed the survey, which yielded 88.7% response rate, representing 66.0% of the total agriculture teacher population in Louisiana. No attempt was made to administer the instrument to those teachers who did not attend the leadership camp.

The participants were 68.7% male ($n$ = 108) and 31.3% female ($n$ = 49). Participating Louisiana agricultural educators' age ranged from 22-67 with an average age of about 41 years old. The average agricultural education teaching experience was a little more than 13 years. Teachers from each of the four FFA areas were present in the sample, with 22 (14%) from Area I, 29 from Area II (18.5%), 59 from Area III (37.6%), 42 from Area IV (26.8%), and 5 who did not indicate the area in which they teach (3.2%). According to the Louisiana FFA directory, there are 193 chapters in Louisiana with 33 (17.1%) in Area I, 41 (21.2%) in Area II, 60 (31.1%) in Area III, and 59 (30.1%) in Area IV.

The instrument utilized to collect data comprised of 18 items divided into three sections. The first section was comprised of researcher-created items utilized to determine smartphone availability, as well as Louisiana agriculture teachers' openness to utilizing them for instruction. The second section was comprised of items modified from Coley et al. (2014) to determine self-perceived level of educational technology adoption as well as educational technologies these teachers utilize currently. The final section was utilized to determine the demographics of the teacher participants. Items related to smartphone availability and use of educational technologies was considered nominal data, therefore reliability estimates were not calculated. The reliability of the items related to openness was calculated *post hoc* utilizing Cronbach's Alpha (α = .79).

A panel of three agricultural education faculty evaluated the instrument for face and content validity. Further, five active Louisiana agriculture teachers completed the instrument and provided feedback on the items. Minor changes were made to some items after the instrument was field-tested. No initial items were eliminated. Data associated with each research objective were analyzed through descriptive statistics, including frequencies, percentages, minimum value, and maximum value. Due to the ordinal nature of the data collected, the mode was determined as the most appropriate measure of central tendency to meet the needs of objectives two and three.

## Findings

### Objective 1: Availability of smartphones for teaching and learning

The first objective of this study sought to describe the smartphone usage policy for teachers and students in Louisiana secondary schools that offer agricultural education courses (see Table 1). In all, 143 (91.1%) personally owned a smartphone and132 (84.1%) of the teachers reported having Wi-Fi access in their classrooms. Over half, (*n* = 85) of the teacher participants indicated their school district policy allowed teachers to utilize smartphones for educational purposes while 51 (32.5%) reported they could not and 21 (13.4%) did not know if their district policy allowed teachers to use smartphones for learning. A total of 48 (30.6%) reported students in their district could utilize smartphones for learning, while 105 (66.9%) reported their district policy was against student smartphone use.

Table 1

*Smartphone Availability of Louisiana School-based Agricultural Educators and Students* (n = 157)

| Item | Yes | No | I don't know |
|---|---|---|---|
| Do you own a smartphone? | 143 | 14 | 0 |
| Do you have access to "Wi-Fi" (wireless internet) in your classroom? | 132 | 22 | 2 |
| Does your school board policy allow teachers to use smartphones in the classroom as a teaching tool? | 85 | 51 | 21 |
| Does your school board policy allow students to use smartphones in the classroom for educational purposes? | 48 | 105 | 4 |

### Objective 2: Openness to utilizing smartphone technology for teaching and learning

The second objective was to describe Louisiana agricultural educators' openness toward students using smartphones for learning. The greatest number of teachers indicated they were *Somewhat Open* (*n* = 48; 29.1%) followed by *Open* (*n* = 38; 23.0%) to the idea of allowing students to use smartphones for learning (see Table 2). Over one-fifth (n = 34) of the teachers indicated they were *Not at all Open* to the idea of students utilizing smartphones for learning. Further, at total of 50 (30.3%) of the teachers indicated they were *Open* to the idea of participating in a professional development on utilizing smartphones for learning. Another 48 (29.1%) teachers indicated they were *Somewhat Open* to attending a smartphone centered professional development.

Table 2

*Louisiana School-based Agricultural Educators' Openness to Utilizing Smartphone Technology for Teaching and Learning* (n = 157)

| Item | *Not at all Open* | | *Somewhat Open* | | *Open* | | *Very Open* | | *Entirely Open* | | *Mode* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | *f* | *%* | |
| Openness to students utilizing smartphones for learning | 34 | 20.6 | 48 | 29.1 | 38 | 23.0 | 15 | 9.1 | 21 | 12.7 | 2 |
| Openness to participating in professional development on smartphones for learning | 20 | 12.1 | 48 | 29.1 | 50 | 30.3 | 16 | 9.7 | 23 | 13.9 | 3 |

*Note.* Percentages do not equal 100 due to missing responses

**Objective 3: Educational technologies incorporated into instruction**

The third research objective sought to describe Louisiana agricultural educators' incorporation of educational technology into classroom instruction (see Table 3). Teachers were asked to indicate their level of access to various educational technologies. Overall, the most commonly utilized educational technologies were the teacher desktop/laptop ($n$=125) and digital projector ($n$=72), both of these items received modal scores of 6, indicating many teachers use these technologies on a daily basis. These teachers indicated they use test generation software and PowerPoint on a weekly basis and DVD players are used monthly. The remaining 10 educational technologies each received modal scores of zero, indicating many teachers do not have access to the technologies. However, of the teachers who do have access to these ten items, the smartboard is used daily, iPads/tablets are used weekly, and YouTube is used monthly. The teachers indicated they have access to the remaining educational technologies, but never use them.

**Objective 4: Self-perceived level of educational technology adoption**

The final research objective sought to determine Louisiana agricultural educators self-perceived level of educational technology adoption. The most frequent response ($n$ = 77; 49.0%) was *I let others test new technologies before I adopt them*, followed ($n$ = 50; 31.8%) by *I am among the first to adopt new technologies as they become available*. Sixteen (10.2%) of the teachers indicated *I rarely adopt new technologies* and 12 (7.6%) marked *I create my own technology resources before anyone shows me*.

Table 4

*Louisiana Agricultural Educators Self-Perceived Level of Educational Technology Adoption* (n = 157)

| Response | *f* | % |
|---|---|---|
| I let others test new technologies before I adopt them | 77 | 49.0 |
| I am among the first to adopt new technologies as they become available | 50 | 31.8 |
| I rarely adopt new technologies | 16 | 10.2 |
| I create my own technology resources before anyone shows me | 12 | 7.6 |
| Missing | 2 | 1.3 |

Table 3

*Louisiana School-based Agricultural Educators Use of Educational Technologies*

| Educational Technology | *Do not have Access* | *Have access, but never use* | *Use a few times per year* | *Use a few times per semester* | *Use Monthly* | *Use Weekly* | *Use Daily* | *Mode* |
|---|---|---|---|---|---|---|---|---|
| Teacher desktop/laptop (*n* = 156) | 6 | 1 | 2 | 3 | 8 | 11 | 125 | 6 |
| Digital projector (*n* = 156) | 10 | 9 | 5 | 8 | 16 | 36 | 72 | 6 |
| Test generation software (*n* = 155) | 28 | 15 | 12 | 25 | 24 | 39 | 12 | 5 |
| PowerPoint (*n* = 150) | 4 | 3 | 5 | 14 | 13 | 56 | 55 | 5 |
| DVD player (*n* = 157) | 9 | 7 | 26 | 33 | 35 | 33 | 14 | 4 |
| YouTube (*n* = 157) | 40 | 4 | 14 | 19 | 34 | 33 | 13 | 0 |
| Smart board (*n* = 156) | 75 | 10 | 5 | 3 | 6 | 17 | 40 | 0 |
| Smartphone (*n* = 154) | 46 | 30 | 11 | 14 | 16 | 12 | 25 | 0 |
| iPad or other tablet (*n* = 156) | 62 | 18 | 11 | 11 | 12 | 25 | 17 | 0 |
| Apps (*n* = 154) | 54 | 21 | 21 | 16 | 17 | 11 | 14 | 0 |
| Document camera (elmo) (*n* = 156) | 77 | 27 | 7 | 13 | 12 | 8 | 12 | 0 |
| Facebook and/or Twitter (*n* = 156) | 79 | 44 | 4 | 0 | 5 | 13 | 11 | 0 |
| Instagram and/or Snapchat (*n* = 156) | 85 | 56 | 4 | 1 | 1 | 6 | 3 | 0 |
| Facetime and/or Skype (video call) (*n* = 150) | 78 | 54 | 10 | 7 | 3 | 1 | 0 | 0 |
| Student response system (clickers) (*n* = 156) | 102 | 31 | 5 | 11 | 1 | 2 | 4 | 0 |

Note. 0 = do not have access, 1 = have access but never use, 2 = use a few times per year, 3 = use a few times per semester, 4 = use monthly, 5 = use weekly, and 6 = use daily.

## Conclusions/Recommendations/Implications

Overall, even though smartphone ownership by Louisiana agriculture teachers mirrors the general public very few indicate daily or even weekly usage of this technology for learning. Over 90% of Americans between the ages of 18 and 49 reported they own a smartphone (Pew, 2017) and our data revealed 91% of Louisiana agriculture teachers own a smartphone. Over half of Louisiana agriculture teachers are allowed by school board policy to use their smartphones in the classroom for instruction and have Wi-Fi access in their classrooms. Despite ready availability, Louisiana agriculture teachers are only somewhat open to the idea of students using smartphones in class. Results from this study indicate that approximately two-thirds of schools in Louisiana ban students from using smartphones for learning, consistent with a previous report by Commonsense Media (2010). The disconnect between availability and a willingness to use the technology within a classroom environment adds to the idea of a new digital divide between students and teachers (Thomas & O'Bannon, 2015). This finding is consistent with the idea put forth by Palak and Walls (2009) that the availability of technology does not mean teachers will embrace and incorporate it. Perhaps teachers, although open to the idea of utilizing smartphones for learning, perceive it to be high in complexity, thus outweighing the positive attributes (Rogers, 2003). Future research is warranted to determine what attributes of smartphones are perceived by Louisiana agriculture teachers as being beneficial or detrimental to the learning process (Rogers, 2003). Per Guskey (2002), teachers should engage in high quality professional development before change in classroom practice can take place. Results from previous studies have determined that agriculture teachers are often self-taught in terms of educational technologies (Kotrlik & Redmann, 2009; Kotrlik et al., 2009; Redmann et al., 2003). It is possible that these teachers may perceive utilizing the smartphone for educational purposes to be complex because they have never received training on how to incorporate them into their pedagogy.

A plethora of research insists that student perceptions of smartphone use in formal education are more positive than teacher perceptions (Kalinic, et al., 2011; Tindell & Bohlander, 2011; Thomas & O'Bannon, 2015; Berry & Westfall, 2015). That is not to say that students do not recognize the problems with using smartphones in education. Studies have indicated that students often share the same concerns teachers have about smartphones being used to cheat, disturb, or bully (Thomas & Muñoz 2016; Gao, Yan, Wei, Liang, & Mo, 2017). To date, most of the research on student perceptions towards smartphones for educational purposes is collected at the university level. For technology perceptions and policies to change, more research should be conducted in secondary education, and namely agriculture classes, to gain insight from students on the benefits of technology integration. Additional research should be focused on secondary level administrators who are charged with enforcing district policy regarding the allowance of smartphones to determine what procedures or practices would be beneficial to students and teachers in secondary education.

Despite it not being used readily within the classroom, agriculture teachers in this study indicated they are open to the idea of professional development geared towards implementing smartphone technology into classroom instruction. Kotrlik and Redmann (2009) found that 92% were self-taught in terms of where they attained technology skills. Similarly, a study of Tennessee agriculture teachers found the most common ways for teachers to learn technology were through personal trial and error, interaction with other faculty, and independent learning (Coley et al., 2015).

As with similar studies, teachers in Louisiana indicated using teacher-centered technology most often in their educational practice. The majority of teachers indicated that they used a teacher desktop/laptop, digital projectors, test generation software, and PowerPoint on a daily or weekly basis. This research is strikingly similar to previous studies in agricultural education (Kotrlik & Redmann, 2009; Coley et al., 2015; Williams et. al., 2014) and indicates that agriculture teachers' use of technology has remained relatively unchanged in the past 10 years. Previous research on teacher usage of mobile devices indicated that most use their devices for passive learning and administrative duties rather than collaborative projects and material creation (Thomas & Muñoz, 2016). Research should be conducted to determine what first and second order barriers are inhibiting agriculture teachers from using newer technologies in districts with favorable technology policies.

Findings from this study indicate that the teachers' perceptions of their educational technology adoption level are comparable to Roger's (2003) description of the categories of adopters. Over 80% of teachers in this study indicated they either are among the first to adopt educational technology or let others try new technologies prior to adopting. These categories correspond with the early adopters, early majority, and late majority as described by Rogers (2003). Per the theory, these three categories of adopters should make up 81.5% of the individuals in a given system. A larger percentage of teachers perceived themselves as innovators than Roger's (2003) theory would have predicted. Roger's (2003) states that innovators make up 2.5% of the individuals in a system, while 7.6% of teachers in this study indicate they create new technologies before anyone shows them. Finally, just over 10% of teachers indicated they rarely adopt new technologies, indicating they could be considered laggards. Roger's (2003) showed laggards should comprise 16% of a social system. The discrepancy between Rogers (2003) adopter categories and what we reported in this study may be attributed to non-response. Future studies should attempt to contact non-respondents to determine if they tend to be of a particular adopter category. Rogers (2003) describes laggards as isolated within their social system and they also tend to be traditional and suspicious. It could be that our lower level of self-reported laggards is attributed to laggards either not attending a leadership camp session or choosing not respond.

Results from this study show the large majority of teachers are willing to adopt educational technologies to enhance student learning. If teachers are indeed open to new technology and if they are willing to allow other teachers to implement technology before them, then Guskey's (2002) model for teacher change would allow for greater opportunities for teachers to successfully adopt new educational technology. According to Guskey (2002), teachers must learn about the technology, then see the impact of that technology before they will consider adoption. Professional development opportunities provided by teachers who integrate technology successfully, can be an excellent opportunity to help teachers move from becoming aware of new technology to seeing the value in including the technology as part of their educational practice. For new technology to be adopted, a new professional development model must be established in Louisiana to help teachers move into new technology integration.

This study only looked at whether teachers were using smartphone technology in their programs. From this study, it is recommended that further research should be conducted to determine what basic and advanced smartphone functions agriculture teachers in Louisiana are actually using, specifically, in programs where teachers have access to technology and are allowed to use it for educational purposes, but students are not. A better understanding of what technologies are available and useful for teachers can be beneficial when developing professional development opportunities to encourage educational technology integration.

As technology increases, education will be expected to continue to integrate. If teachers in Louisiana have not increased their technology adoption in the past 10 years, how can they be expected to integrate at even higher rates? Future research and practice should be geared toward determining what technologies can be used, how to best provide professional development to teachers and how to help teachers measure the impact of those technologies in their programs.

**References**

Berry, M. J., & Westfall, A. (2015). Dial D for distraction: The making and breaking of cell phone policies in the college classroom. *College Teaching*, *63*(2), 62–71.

Bialo, E. R., & Sivin-Kachala, J. (1996). The effectiveness of technology in schools: A summary of recent research. *School Library Media Quarterly, 25*, 51–57. Retrieved from http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslpubsandjournals/slr/edchoice/SLMQ_EffectivenessofTechnologyinSchools_InfoPower.pdf

Blair, N. (2012). Technology integration for the new 21st century learner. *Principal*, *91*(3), 8–11. Retrieved from http://www.naesp.org/sites/default/files/Blair_JF12.pdf

Broekhuizen, L. (2016). The paradox of classroom technology: Despite proliferation and access, students not using technology. Retrieved from http://www. advanc-ed.org/sites/default/files/AdvancED_eleot_Classroom_Tech_Report.pd

Buquoi, B., McClure, C., Kotrlik, J. W., Machtemes, K., & Bunch, J. C. (2013). A national research survey of technology use in the BSW teaching and learning process. *Journal of Teaching in Social Work, 33*, 481–495. doi: 10.1080/08841233.2013.833577

Coley, M. D., Warner, W. J., Stair, K. S., Flowers, J. L., & Croom, D. B. (2015). Technology usage of Tennessee agriculture teachers. *Journal of Agricultural Education, 56*(3), 35–51. doi: 10.5032/jae.2015.03035

CommonSense Media. (2010). *Hi-tech cheating: Mobile phones and cheating in schools: A national poll.* Retrieved from https://www.commonsensemedia.org/blog/cheating-goes-hi-tech

Christensen, R. (2001). Effects of technology integration education on the attitudes of teachers and students. *Journal of Research on Technology in Education, 34*(4), 411–433. 10.1080/15391523.2002.10782359

Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning? *EDUCAUSE Quarterly*, *30*(2), 51–58. Retrieved from http://er.educause.edu/~/media/files/article-downloads/eqm0726.pdf

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813–834. doi: 10.3102/00028312038004813

Edgar, D. W., Retallick, M. S., & Jones, D. (2016). Research priority 4: Meaningful, engaged learning in all environments. In T. Roberts, A. Harder, & M. Brashears (Eds.), *American Association for Agricultural Education National Research Agenda* (pp. 37–40). Retrieved from http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47–61. doi:10.1007/BF02299597

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration?. *Educational Technology Research and Development*, *53*(4), 25–39. doi:10.1007/BF02504683

Froese, A. D., Carpenter, C. N., Inman, D. A., Schooley, J. R., Barnes, R. B., Brecht, P. W., & Chacon, J. D. (2012). Effects of classroom cell phone use on expected and actual learning. *College Student Journal*, *46*(2), 323–332.

Gao, Q., Yan, Z., Wei, C., Liang, Y., & Mo, L. (2017). Three different roles, five different aspects: Differences and similarities in viewing school mobile phone policies among teachers, parents, and students. *Computers & Education*, *106*, 13–25. doi: 0.1016/j.compedu.2016.11.007

Gray, L., Thomas, N., & Lewis, L. (2010). Teachers' use of educational technology in US public schools: 2009. First Look. NCES 2010-040. *National Center for Education Statistics*. Retrieved from https://nces.ed.gov/pubs2010/2010040.pdf

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, *8*(3), 381–391. doi: 10.1080/135406002100000512

Heafner, T. (2004). Using technology to motivate students to learn social studies. *Contemporary Issues in Technology and Teacher Education, 4*(1), 42–53. Retrieved from http://www.citejournal.org/volume-4/issue-1-04/social-studies/using-technology-to-motivate-students-to-learn-social-studies/

Herold, B. (2016, February 5). Technology in education: An overview. *Education Week*. Retrieved from http://www.edweek.org/ew/issues/technology-in-education/

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, *55*(3), 223–252. doi: 10.1007/s11423-006-9022-5

Kaku, M. (2011). *Physics of the future: How science will shape human destiny and our daily lives by the year 2100*. New York: Anchor Books.

Kalinic, Z., Arsovski, S., Stefanovic, M., Arsovski, Z., & Rankovic, V. (2011). The development of a mobile learning application as support for a blended eLearning environment. *Technics Technologies Education Management*, *6*(4), 1345–1355. doi: 10.1016/j.sbspro.2013.10.446

Keengwe, J., Schnellert, G., & Jonas, D. (2014). Mobile phones in education: Challenges and opportunities for learning. *Education and Information Technologies*, *19*(2), 441–450. doi: 10.1007/s10639-012-9235-7

Kotrlik, J. W., & Redmann, D. H. (2009). A trend study: Technology adoption in the teaching-learning process by secondary agriscience teachers—2002 and 2007. *Journal of Agricultural Education, 50*(2), p. 62–74. doi: 10.5032/jae.2009.02062

Kotrlik, J. W., Redmann, D. H., Harrison, B. C., & Handley, C. H. (2000). Information technology related professional development needs of Louisiana agriscience teachers. *Journal of Agricultural Education, 41*(1), 18–29. doi: 10.5032/jae.2000.01018

Kuznekoff, J. H., Munz, S., & Titsworth, S. (2015). Mobile phones in the classroom: Examining the effects of texting, twitter, and message content on student learning. *Communication Education*, *64*(3), 344–365. doi: 10.1080/03634523.2015.1038727

Lenhart, A. (2009). Teens and sexting. *Pew Internet & American Life Project*, *1*, 1–26. Retrieved from http://www.pewinternet.org/files/old-media//Files/Reports/2009/PIP_Teens_and_Sexting.pdf

Lindner, J. R., Rodriguez, M. T., Strong, R., Jones, D., & Layfield, D. (2016). Research Priority Area 2: New Technologies, Practices, Products Adoption Decisions. In T. Roberts, A. Harder, & M. Brashears (Eds.), *American Association for Agricultural Education National Research Agenda* (pp. 37–40). Retrieved from http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Liu, M., Scordino, R., Renata, G. Navarrete, C., Yujung, K., & Lim, M. (2015). A look at research on mobile learning in K-12 education from 2007 to the present. *Journal of Research on Technology in Education*, *46*(4), 325–372. doi: 10.1080/15391523.2014.925681

McCoy, B. (2013). Digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. *Journal of Media Education, 4*(4), 5–14. Retrieved from http://digitalcommons.unl.edu/journalismfacpub/71/

Murphrey, T. P., Miller, K. A., & Roberts, T. G. (2009). Agricultural science and technology teachers' perceptions of iPod an MP3 technology integration into curricular and cocurricular activities. *Journal of Agricultural Education, 50*(4), 110–119. doi: 10.5032/jae.2009.04110

Murphy, T. H., & Terry, H. R. (1998). Opportunities and obstacles for distance education in agricultural education. *Journal of Agricultural Education, 39*(1), 28–36. doi: 10.5032/jae.1998.01028

Obringer, S. J., & Coffey, K. (2007). Cell phones in American high schools: A national survey. *Journal of Technology Studies*, *33*(1), 41–47. Retrieved from http://scholar.lib.vt.edu/ejournals/JOTS/v33/v33n1/obringer.pdf

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, *41*(4), 417–441. Retrieved from https://eric.ed.gov/?id=EJ844274

Peake, J. B., Briers, G., & Murphy, T. (2005). Relationships between student achievement and levels of technology integration by Texas agriscience teachers. *Journal of Southern Agricultural Education Research*, *55*(1), 19–32. Retrieved from http://pubs.aged.tamu.edu/jsaer/pdf/Vol55/55-01-019.pdf

Pew Research Center. (2017). *Who owns cell phones and smartphones?* Washington, DC. Retrieved from http://www.pewinternet.org/chart/who-owns-cellphones-and-smartphones/

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon 9*(5). 1–6. Retrieved from: http://web.me.com/nancyoung/visual_literacy/site_map_and_resources_les/Digital_Natives_Digital_Immigrants.pdf

Reiser, R. A. (2001). A history of instructional design and technology: Part I: A history of instructional media. *Educational Technology Research and Development, 49*, 53–64. doi: 10.1007/BF02504506

Redmann, D. H., Kotrlik, J. W., & Douglas, B. B. (2003). Factors related to technology integration in instruction by marketing education teachers. *Journal of Career and Technical Education, 19*(2), 29–46. Retrieved from http://files.eric.ed.gov/fulltext/EJ675784.pdf

Roberts, T. G., & Dyer, J. E. (2004). Characteristics of effective agriculture teachers. *Journal of Agricultural Education, 45*(4), 82–95. doi: 10.5032/jae.2004.04082

Rogers, E. M. (2003). *Diffusion of innovations.* New York: Free Press.

Schrum, L. (1999). Technology professional development for teachers. *Educational Technology Research and Development*, *47*(4), 83–90. doi: 10.1007/BF02299599

Steel, C. (2012). Fitting learning into life: Language students' perspectives on benefits of using mobile apps. In M. Brown, M. Hartnett, & T. Stewart (Eds.), *ascilite 2012: Future Challenges, Sustainable Futures*. Wellington, New Zealand.

StatisticsBrain (2015) Technology & Computers in Classroom Statistics. Retrieved from: http://www.statisticbrain.com/technology-computers-in-classroom-statistics/

Su, C., & Cheng, C. (2015). A mobile gamification learning system for improving the learning motivation and achievements. *Journal Of Computer Assisted Learning*, *31*(3), 268–286. doi:10.1111/jcal.12088

Thomas, K., & Muñoz, M. A. (2016). Hold the phone! High school students' perceptions of mobile phone integration in the classroom. *American Secondary Education*, *44*(3), 19–37. Retrieved from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?sid=bf89607f-cfa8-4db4-8dc6-2f894d47e42f%40sessionmgr120&vid=2&hid=114

Thomas, K., & O'Bannon, B. (2015). Looking across the new digital Divide: a comparison of inservice and preservice teacher perceptions of mobile phone integration. *Journal of Technology and Teacher Education, 23*(4), 561–581. Retrieved from http://www.learntechlib.org/p/149026

Thomas, R., Adams, M., Meghani, N., & Smith, M. (2002). *Internet integration in high schools: Patterns, opportunities, and barriers*. St. Paul, MN: National Research Center for Career and Technical Education. (ERIC Document Accession No. ED 476034). Retrieved from http://www.nccte.org/publications/infosynth esis/r&dreport/Internet_Integration.pdf

Tindell, D. R., & Bohlander, R. W. (2011). The use and abuse of cell phones and text messaging in the classroom: A survey of college students. *College Teaching*, *60*(1), 1–9. doi: 10.1080/87567555.2011.604802

Traxler, J. (2009). Current state of mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 247–264). Edmonton, Alberta Canada: Athabasca Press.

Whisenhunt, J., Blackburn, J. J., & Ramsey, J. W. (2010). From blackboards to Bluetooth®: Wireless slate technology in agriculture classrooms. *The Agricultural Education Magazine, 83*(3), 6–8. Retrieved from http://www.naae.org/profdevelopment/magazine/archive_issues/Volume83/2010_11-12.pdf

Williams, M. R., Warner, W. J., Flowers, J. L., & Croom, D. B. (2014). Teaching with technology: North Carolina agriculture teachers' knowledge acquisition, attitudes, and identified barriers. *Journal of Agricultural Education, 55*(5), 1–15. doi: 10.5032/jae.2014.05001

Wood, E., Mueller, J., Willoughby, T., Specht, J., & Deyoung, T. (2005). Teachers' perceptions: Barriers and supports to using technology in the classroom. *Education, Communication & Information*, *5*(2), 183–206. doi: 10.1080/14636310500186214